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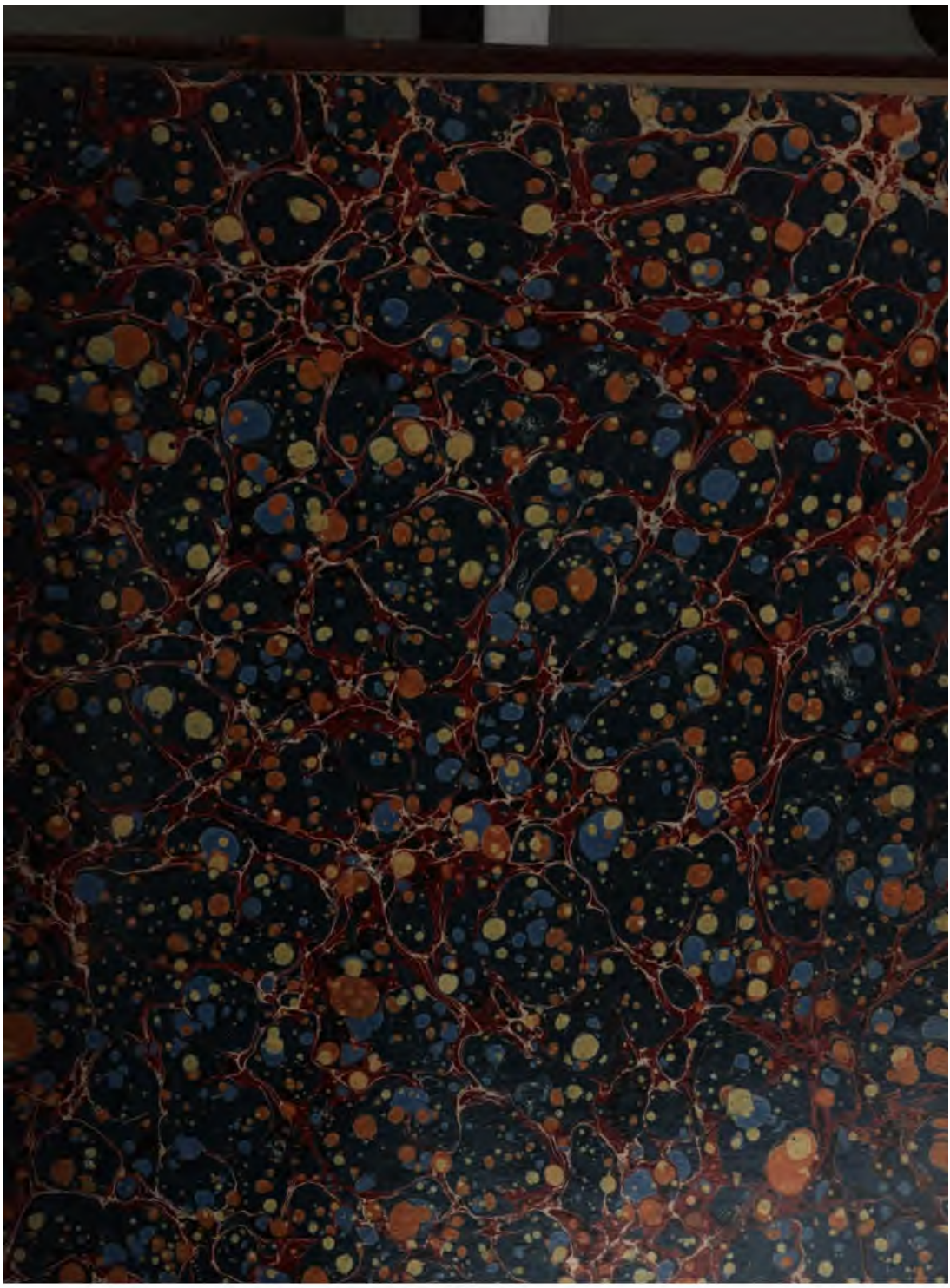

(Frontispiece)

AUTHOR'S CASE

Number and actual size of stones removed by aspiration

UROGENITAL THERAPEUTICS

MEDICAL AND SURGICAL

A TREATISE ON THE PRACTICAL TREATMENT
OF DISEASES OF THE URINARY
AND GENITAL SYSTEMS

BY

FILIPP KREISSL, M. D.
CHICAGO

Fully Illustrated

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Erratum: Under Fig. 134 read catheter cystoscope instead of author's catheter cystoscope.

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PREFACE.

This volume had its inception in the numerous requests made to me by my post-graduate students; consequently it has been my aim to keep in mind the needs of the general practitioner. No attempt has been made to give the etiology, symptomatology and diagnosis of diseases of the urogenital tract, except insofar as it may be necessary to an intelligent description of the treatment.

Many of the minor surgical procedures have been dealt with in detail, with the purpose of enlarging the field of the general practitioner in this line. By familiarizing himself with the technique, indications and ultimate results of the major operations which he might not care to perform, he may be better equipped to advise his patients. At the same time, however, I have avoided noting the many minor and unimportant variations from well-recognized methods of operating, also the modifications of instruments, in order not to unduly encumber the book.

A section on gonorrheal diseases in the female is included because I believe it to be within the field of the physician who is engaged in genito-urinary work. However, no attempt has been made to deal with the gonorrheal diseases of the uterus and its appendages, which would at once open the great field of gynecology.

I have not devoted a special chapter to urogenital neuroses, but these conditions are mentioned from time to time in the general text.

Where it was thought advisable to give a certain surgeon's method of procedure in extenso

C9914

his exact words have been quoted, and full credit given by the addition of his name.

I desire to express thanks to my associate, Dr. John S. Nagel, for his assistance; also to Mr. Jas. K. Parker for his careful and accurate drawings; to the various instrument dealers for the illustrations of surgical instruments, and lastly to my publishers for many valuable suggestions.

FILIPP KREISSL.

92 State St., Chicago, Ill., 1908.

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INTRODUCTION.

The successful treatment of genito-urinary diseases requires chiefly a knowledge of the physiology and pathology of the uro-genital tract and of the urine, and familiarity with the recognized methods of diagnosis in this tract, together with practical experience in their employment. To these methods, among others, belong exploration with bougies and metal sounds, the use of the urethroscope and cystoscope, ureter catheterization, urine segregation and radiography. These and other methods will only be considered here in their relation to the treatment of genito-urinary diseases.

CHAPTER I.

ASEPSIS.

In order to avoid infection of the urinary tract with instruments employed therein we must give particular attention to two points.

Principal Points

1. The employment of aseptic instruments and lubricants.

2. Prevent carrying infectious material into the urethra or from there into the bladder and the kidney.

As to the first, aseptic instruments and lubricants can be secured by simply rendering them aseptic, and maintaining them so from the time we take them in our hands until they enter the urethra.

Sterilizing of Instruments

The safest way to render instruments aseptic is to boil or steam them, and this we do with metal instruments. The addition of one teaspoonful of sodium carbonate to each quart of water prevents oxydation of their surfaces.

Elastic Catheters and Bougies

Soft rubber catheters may be sterilized by boiling in plain water for five minutes. Here, as with all hollow instruments, the air should be expelled from the inside by filling it with water.

Silk web catheters, flexible bougies and capillary instillators do not withstand the boiling process as well as soft catheters, and therefore should be sterilized by exposing them to steam for two hours. To preserve the smooth surface each one must be wrapped separately in a gauze napkin before being placed in the sterilizer.

All these appliances, after being sterilized,

Formaldehyde for Continuous Sterilization

should be thoroughly dried by exposing them to dry heat for a minute or by wiping with a sterile towel and then put away in a suitable sterilized receptacle, where they may be kept in formaldehyde vapor, being then ready for use after twelve hours. Most suitable for the latter purpose is a receptacle consisting of a metal box containing several sliding wire trays on which the various appliances are placed. A glass tray containing

Fig. 1.

4 c. c. (one drachm) of paraform stands on the bottom shelf. The paraform is a formaldehyde preparation which gives off formaldehyde vapor under ordinary temperature.

Portable Catheter Receptacle

Where but few instruments are used one may be able to get along with a glass tube sixteen inches long, which is closed by a rubber top, the interior part of which holds a wire capsule filled with fifteen grains of paraform.

Each instrument, after being used, must be cleansed with soap suds and rinsed with water before being placed in the sterilizer.

L. Casper has devised a very practical steam

sterilizer suitable for the physician who does not use many catheters, and for patients who are compelled to catheterize themselves. Owing to its

Casper's Steam Sterilizer

Fig. 2. Portable aseptic catheter receptacle.

construction several catheters may be sterilized simultaneously without one coming into contact with another, and may also be left in the apparatus until wanted for use. The catheters do not

come in contact with the water and the steam is forced through their lumen, thus insuring a safe and rapid sterilization of the latter within from three to five minutes. Vaporization commences within three minutes after lighting the burner when the boiler is filled with cold water, and within one minute when hot water is used.

Weiss' Formaldehyde Sterilizer for Office Work

A new apparatus and a new formaldehyde preparation devised by Arthur Weiss, of Vienna, eliminates the boiling process entirely and will be appreciated by the practitioner. The instruments, after being cleansed in the usual manner, are suspended on a metal disk, which has a number of openings of different caliber, and then placed

Fig. 3. Casper's steam sterilizer.

in the sterilizer. The latter consists of three parts. The hollow metal base (Fig. 4) into which is fitted a glass cylinder open at the bottom and covered at the top with a ground glass stopper. The hollow base contains a glass receptacle into which is placed the new antiseptic "Autan," a mixture of metallic superoxydes and paraform, which by the addition of water under the development of heat is transformed into gas. The proportion of the powder and the water to be added is five to seven parts. Immediately after pouring the water on the powder the glass cylinder is

placed over the steam. Sterilization is completed within four to six hours. The glass cylinder is then lifted up, the glass receptacle removed and

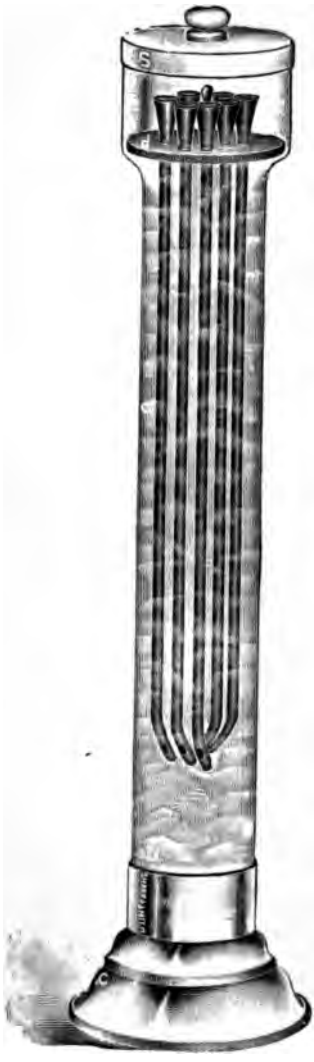


Fig. 4. Autan sterilizer (A. Weiss).

replaced by another one containing a mixture of calcium chloride and ammonium carbonate. The former takes up the excess of condensed water

from the instruments, the latter neutralizes the remaining formaldehyde.

This apparatus is also of eminent value for the purpose of sterilizing cystoscopes and ureter catheters. Heretofore we have had to rely entirely on the antiseptic cleansing of the cystoscope, the optic of which does not permit of boiling at all.

When grasping an instrument for the purpose of using it one should not touch its distal (vesical) end.

Lubricants

A lubricant should not be smeared on with the fingers. If it be vaseline or another fat it should be placed on a piece of sterilized gauze and from there spread over the instruments. If a liquid or semi-liquid it could be poured on the instrument, or the vesical part of the latter dipped into the lubricant.

A good and simple lubricant readily soluble in water is the following preparation:

Gum. Tragacanth,	2.50 gm.	(℈ii)
Glycerin,	10.	(ʒiiss)
Sol. acid carbol. (3 per cent.)	90.	(ʒiii)

(A similar formula is dispensed in tin tubes under the name of KY lubricant.)

These preparations, or glycerin, should be employed as a lubricant for cystoscopes or urethroscopes, and also to all instruments used for injections or instillations.

The lubricant, if kept in a jar or bottle, should be daily sterilized by boiling. This is not necessary with preparations put up in tin tubes.

To prevent carrying infection into the urethra, bladder or kidney, the tissues in the immediate vicinity of the urethral orifice should be cleansed with an antiseptic solution, sublamin, 1:1000 being preferable.

Preceding instrumentation the urethra and

eventually the bladder should be irrigated with a mild antiseptic like a saturated boric acid solution, or oxycyanide of mercury 1:4000 to 1:8000, or astorol 1:4000.

The fluid may be injected by pressure with an irrigator or a hand syringe to which a soft rubber tip has been added. This syringe is described in the section on *Urethritis*.

CHAPTER II.

ANESTHESIA.

Choice of Anesthetics

The selection of the anesthetic for operative work on the urogenital tract requires careful consideration. The danger ordinarily associated with anesthesia is here enhanced, since many of the operations are performed on individuals whose secretory, circulatory and respiratory systems are found below par, either on account of advanced age or because of organic diseases.

Dangers

Local Anesthesia

Local anesthesia may be produced by surface application of the anesthetic or by infiltration. Ethyl chloride, also called kelene, is employed in many minor operations, requiring but a minute or so to be performed. Its effect is due to intense cold produced by evaporation. It is serviceable for opening an abscess, tapping a hydrocele or to anesthetize the skin for the subsequent infiltration with cocain or eucain. To anesthetize the urethral mucosa, cocain, eucain or stovain may be applied over the surface by injecting the fluid into the canal with an ordinary small syringe, or by applying to the posterior urethra and bladder by means of an instillator.

Ethyl Chloride

Cocain

A warm solution is more efficient than a cold solution, and as less of it will produce anesthesia it is safer. In the urethra a one or two per cent. solution is injected; in the bladder, vulva and vagina a four per cent. solution may be employed.

Adrenalin

The addition of adrenalin to a cocain solution largely counteracts its toxic effects.

Cocain should not be employed in the urethra

or bladder in the presence of raw, bleeding surfaces.

Infiltration-Anesthesia

The infiltration anesthesia method is generally employed in operations for phimosis, varicocele, hydrocele, extirpation of inguinal glands, castration and external urethrotomy.

Schleich's solution is used for regional anesthesia, also cocain, beta-eucain, or alypin. The lat-

Fig. 5.

ter is the least toxic of all and preferable where constriction of the operating field is inexpedient. The formula for Schleich's solution which is used in different strengths is as follows:

Cocain. hydrochlor., 0.2 (0.1—0.01)

Morph. hydrochlor., 0.025
Sodium chlor., 0.2
Aqu. destill ad., 100.

General Anesthesia

As a general anesthexic ether is given preference over chloroform, but this does not seem to be justified since the effect of a prolonged ether narcosis on the diseased kidney is just as unfavorable as that of chloroform.

Short Term Anesthesia

In order to avoid the dangers associated with the administration of ether and chloroform, short-

Fig. 6

Nitrous Oxide and Somnoform

term anesthesia for short operations and spinal anesthesia for prolonged operations have been successfully substituted. Nitrous oxide, pure or mixed with oxygen and somnoform, are most serviceable. I prefer somnoform because of the absence of the untoward qualities of nitrous oxide and the simplicity of its administration, which is as follows:

Technique

"Stand far enough back to be out of the pa-

tient's sight. Into the opening which appears in the top of the horizontal cylinder when the side valve is opened by pressure on the back of the movable portion, put a 3c.c. capsule of somnoform, point down. Steady the projecting portion of capsule with the thumb and middle finger and press the forefinger steadily down on the upper end of the capsule until a slight explosion is heard when the anesthetic is expelled from the capsule. Remove and throw away the projecting portion, but pay no attention to the balance. Release the pressure on valve and allow to close.

Fig. 7.

When the capsule broke the somnoform fell on the lint and saturated it. At the same time some of the somnoform vapor was driven into the bag, but did not necessarily inflate it. The first vapors

immediately rise and escape during the first two breaths by the patient while valves are open. These first fumes have great anesthetic power, but are much more irritating than the balance of the somnoform vapors and more liable to cause

Fig. 8

the patient to choke and cough. The anesthesia they induce is generally of a preliminary stage and the patient would awake at the beginning of the operation.

"Take inhaler in the right hand with the thumb about the forward side of the upright cylinder, the forefinger on the back of the movable horizontal portion and the other fingers closing about the back of the upright part. The facepiece should then point towards the patient's face.

"Retain position at side and rear of patient, reach forward the right hand and apply inhaler lightly to patient's face *with valves wide open.* Make no effort to exclude all air around margin of hood until after the *first inhalation.* Then press firmly against face, excluding all air at the margin of hood.

"Allow two or three inhalations with the valves

Fig. 9.

wide open. The first and perhaps the greatest danger from general anesthetics is that *too sudden application induces shock to the general nervous system through the nasal and pharyngeal nerves.* The danger at this point safely passed, there is little danger to the patient till the stage of over-dosage is reached. Keeping the valves open for the first two or three inhalations allows the

patient to breathe mostly air, but enough somnoform vapor enters the air passages to desensitize the nerves in the nasal and pharyngeal membranes and avoids danger of shock through these nerves. *After the second exhalation allow the valves to close gradually* by releasing the pressure of the forefinger in such way as to catch the *third exhalation in the bag with the valves closed;* now step in front of patient.

"*Muscular relaxation* is generally, though not always, present in complete anesthesia, but when present is an infallible guide. If the patient's hands lie limp and unclasped in the lap as suggested above, tests for relaxation will be greatly facilitated. Raise the hand gently and release it in air. If it falls without control by the patient, *complete anesthesia is present* and any short operation may be done.

"The actions of the pupil and eyeball are excellent guides in somnoform anesthesia. So soon as somnoform vapor begins to exert its anesthetic action the pupil will begin to dilate and when anesthesia is complete, dilatation will be marked.

Corneal Reflex

"*The corneal reflex,* which is regarded as a practically infallible sign of complete anesthesia by chloroform or ether, is not a reliable guide in the earliest stages of complete anesthesia by somnoform. It will be shown a little later that *it is a valuable guide in the deeper stages of somnoform anesthesia.*

"If the intended operation be very brief, the administration of somnoform may be stopped *as soon as the eyeball is seen to be rolled noticeably upward with the pupil noticeably dilated, and either muscular relaxation or automatic breathing is present.*

Sign of Complete Anesthesia

"A sign which is infallible, though sometimes difficult to detect, is that in *complete anesthesia the breathing becomes rhythmic and automatic as*

in sleep. When the operator can determine that the breathing is of this nature, he may feel certain that complete anesthesia is present.

"For operations of greater duration, administration should be continued until a deeper stage of complete anesthesia has been induced. Guides

INFLATABLE RUBBER MARGIN
CELLULOID FACE PIECE
CIRCLE SUPPORTING FACE PIECE
CAPSULE OPENING AND AIR VALVE
AIR VALVE
SOMNOFORM
TELESCOPING PORTION OF HORIZONTAL CYLINDER WHEN PUSHED IN OPENS AIR VALVES AND CAPSULE OPENING
SHOULDER OVER WHICH NECK OF BAG STRETCHES
FLANGE
LOCK FOR REMOVABLE CAP
VALVE
REMOVABLE CAP
SUPPORTING SPRING TO HOLD LINT

Fig. 10.

to this deeper stage of anesthesia will be found *in the action of the eyeball and pupil, the breathing and muscular relaxation.*

"*As anesthesia deepens the dilatation of the pupil becomes very marked* and the eyeball becomes fixed in position and insensitive—set, some operators call it.

"While inducing this stage of anesthesia keep the eyelids parted as before and by pressure of the forefinger through the upper lid the sensitiveness of the eyeball and its becoming 'set' may be intelligently determined. It is not necessary or advisable to touch the cornea with the finger. When the eyeball has become 'set' *a deep stage of anesthesia is present and operating may begin immediately.*

"Other guides at this time will be quite clearly marked since muscular relaxation is nearly al-

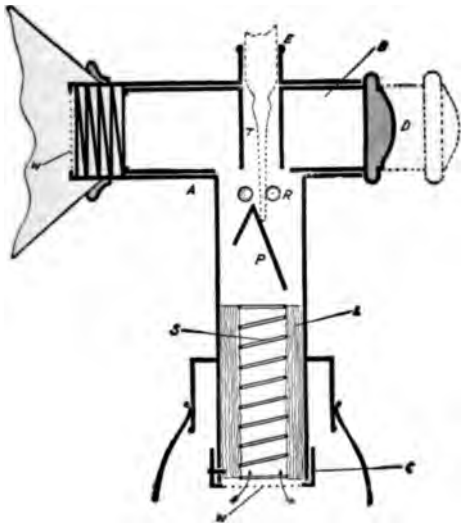


Fig. 11.

ways present and the breathing, which has become automatic, is usually marked by snoring.

"By the study of these guides the operator develops an 'anesthetic sense' by which he learns to tell when anesthesia is complete and administer somnoform to just the extent necessary to prolong anesthesia during the operation. This sense comes *only from experience* and while it is being gained the hints herein will be guides by which any intelligent operator may steer safely. So ex-

act does this "anesthetic sense" become that many operators can administer somnoform so as to produce any desired period of complete anesthesia, in minutes and seconds, up to the maximum period."

Somnoform Preceding Ether or Chloroform Narcosis

By using somnoform preceding ether or chloroform narcosis, much less of the latter agents will be required during the operation. Somnoform will also be found very useful in all small operations where local anesthesia would suffice, but cannot be employed on account of extreme nervousness of the patient. It is very satisfactory in suprapubic cystotomy when performed for the removal of a stone or for drainage.

Spinal Anesthesia

Standing midway between local and general anesthesia is so-called spinal anesthesia, consisting of the injection of tropo-cocain into the subarachnoid space, which produces complete anesthesia, below the point of injecting, for from thirty minutes to one hour. The element of danger by this method in former years has been materially lessened through improved technique. The patient may be seated on a chair or table, his back rounded by leaning forward, whereby the spaces between the spinous processes are widened. The region of the lumbar spine and the loin is then cleansed as in any major operation. The third or fourth spinous process is now located with the tip of the middle finger, which is held upon the spot, while with the other hand the needle is inserted one-fourth inch to the right or left of the median line, and plunged forward, upward and inward until spinal fluid commences to flow. Five c.c. of the latter are collected in a sterile graduated medicine glass containing 0.06 (1 grain) of tropococain. The latter being readily dissolved in the spinal fluid is now returned into the subarachnoid space by means of a sterile syringe, and the needle withdrawn (Zuckerkandl's method).

Technique

Tropococain

Zuckerkandl's Method

While the powder is being dissolved and the fluid drawn into the syringe, the proximal opening of the needle is kept closed with a metal cap or stopper.

Accidents, fatalities or failure to produce analgesia are due to a faulty technique rather than to the method. The former may be due to an overdose or to an impure drug or to lack of antiseptic and aseptic precautions. The absence of analgesia has been observed when stavain was used instead of tropococain. Even with the latter the method sometimes fails, but this is usually due to a faulty technique. It happens when the tip of the needle slips out of the subarachnoid space while the tropococain is being dissolved in the spinal fluid, and the latter returned without making sure of the position of the point of the needle. Such mistake may be readily guarded against; it is only necessary to watch the proximal end of the needle after removing the stopper. If no spinal fluid flows the point of the needle obviously has left the spinal canal.

Kuemmel's Method

Kuemmel and Israel use one to one and one-half c. c. of a sterilized tropo-cocain solution. This is placed in a record syringe having a capacity of five c. c.; is mixed with the spinal fluid which is drawn directly from the needle into the syringe and then returned into the subarachnoid space. If blood flows from the needle, or if blood is mixed with the spinal fluid, the needle should be withdrawn and another point selected for the injection. In very fleshy patients a small incision through the soft parts covering the spinous process will help to properly insert the needle. Anesthesia is complete within five minutes after the injection.

The anesthetic zone usually terminates upwards at a horizontal plane drawn through the

umbilicus. If analgesia is required in the region above this plane, for instance in operations on the kidney, the patient should be placed in Trendelenburg position for a few minutes immediately after the injection.

Precautions

During the operation the eyes of the patient should be kept covered with a napkin; there should be nothing said referring to the operation, and all clattering of instruments avoided.

Operations on the kidney, bladder and female genitals may be safely performed under spinal anesthesia on patients who cannot be subjected to general anesthesia on account of organic diseases or serious functional derangements.

Kuemmell's statistics of over two hundred operations performed in this way in 1907 do not show a single serious incident, and when weighing the positive danger associated with and following general anesthesia in the above mentioned cases with the relative small danger subsequent to spinal anesthesia, I think we are justified in taking the latter risk.

EMERGENCY SET FOR GENITO-URINARY WORK.

Frequently the practitioner is called away a distance from his home to attend a case where he is compelled to use instruments to check a hematuria or relieve a urine retention. It is necessary for him to carry a comparatively small number of instruments suitable for various conditions and to be able to use them at once without being delayed by prolonged sterilization or being handicapped by the absence of such means.

The causes of retention, according to their frequency, are strictures, prostatic hypertrophy, periurethral or prostatic abscess, traumatic injury of the urethra, a foreign body or a stone impacted in the urethra, paresis or paralysis of the bladder, or a sphincter spasm caused by various lesions.

To relieve retention and eventually check a hemorrhage from the urinary tract, the practitioner needs the following articles:

A few antiseptic tablets (sublamin or bichloride of mercury).

A number of catheters, among them:

A lubricant in a tin tube.

A small package of sterile gauze.

Two Nélaton catheters, one No. 12 Fr. and one No. 22 Fr.

Three Mercier catheters, one No. 12, one No. 22 and one No. 26.

Two metal catheters with a medium large curve, size No. 12 and No. 18 Fr.

The latter catheters should be tunneled at the vesical end in order to connect them with a

Filiform bougie.

A metal catheter with a very large curve for prostatic obstruction, No. 24. This catheter should have a very large eye to permit the removal of blood clots from the bladder.

One Guyon instillation catheter.

One Guyon instillation syringe.

One hand syringe with detachable olive tip.

A trocar for suprapubic puncture.

The Nélaton, Mercier and instillation catheters and filiform bougies may be carried antiseptically in a glass tube provided with a rubber top described in the preceding section.

The metal instruments may be taken care of, together with others, in the usual manner.

CHAPTER III.

DISEASES OF THE URETHRA.

Of the congenital defects of the urethra only those amenable to treatment will be considered.

PARTIAL CONGENITAL OBLITERATION OF THE URETHRA.

Partial obliteration of the urethra most frequently occurs at the meatus, only occasionally in other portions of the canal. If present at the meatus simple meatotomy will be required. If located elsewhere in the anterior urethra, external urethrotomy or eventually urethrostomy will have to be performed to give immediate relief. The methods of operation will be found in the section on the *Treatment of Strictures.*

CONGENITAL DILATATION OF THE URETHRA.

Congenital dilatation of the urethra without a stricture in front of it is quite rare, more frequently both conditions are found together. If observed in an adult, one has to consider the possibility of a cavity caused by a periurethral abscess which has broken into the urethra (an abscess cavity never has a mucous lining, while a urethral diverticulum is always found with one.)

The treatment which is generally successful consists in an incision of the pouch over a grooved staff placed in the urethra; excision of the distended walls, including the redundant folds of the mucosa, and the separate suturing of the mucosa and the skin. Care should be taken not to excise too much tissue at the expense of the normal caliber of the urethra.

CONGENITAL STRICTURE.

Although the existence of congenital stricture is looked upon rather skeptically, the observations of Posner, Bazy, Churchman and the author leave no doubt that this defect occurs and causes symp-

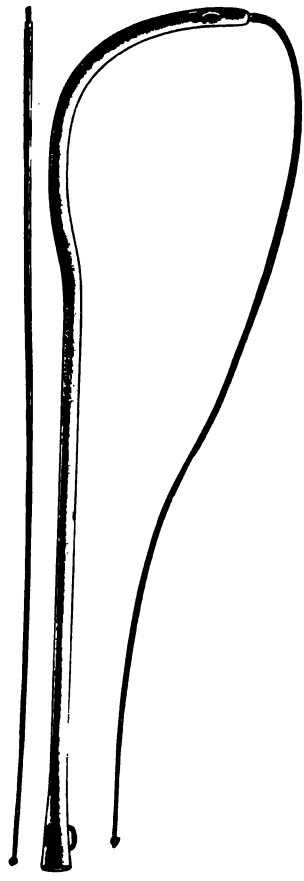


Fig. 12.

toms similar to those induced by strictures of inflammatory or traumatic origin. The relation between congenital stricture and enuresis in children is not very generally known; nor is the hemorrhage properly appreciated which, independent of instrumentation, occasionally is observed in strictures.

The principles governing our action in congenital strictures differ in no way from those of inflammatory or traumatic origin.

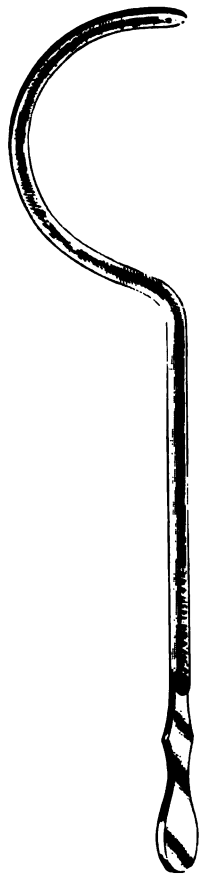


Fig. 13. Grooved metal sound for retrograde catheterization.

Phimosis is frequently associated with congenital stricture of the meatus and should be treated accordingly.

HYPOSPADIAS.

Varieties

Of this congenital malformation we have to differentiate three different types or grades—

1. The balanic or glandular.
2. The penile.
3. The scrotal or perineal hypospadias.

Demands and Methods

The object of the operative treatment is either to correct the abnormal caliber and location of the meatus, or to make a new urethra extending to the

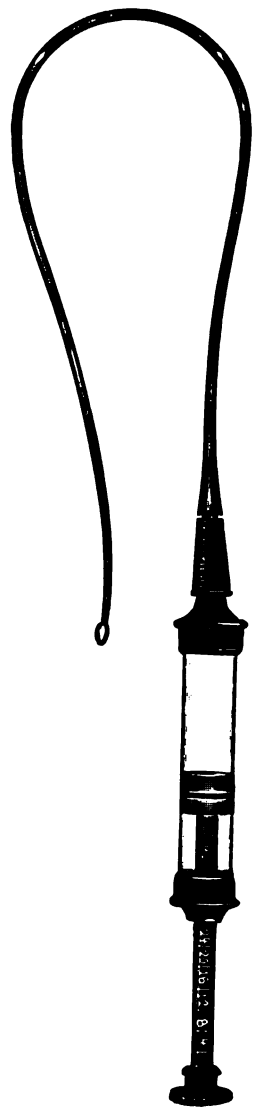


Fig. 14.

tip of the glans. Mild cases of glandular hypospadias, as a rule, are not objects of operative pro-

cedure, unless it be on account of the abnormal narrowing of the urethral orifice. Here, instead of dilating or splitting the urethral mucosa, which gives but temporary results, a complete division with the addition of a plastic procedure has been adopted. One method consists in a circular incision of the skin around the orifice; median split-

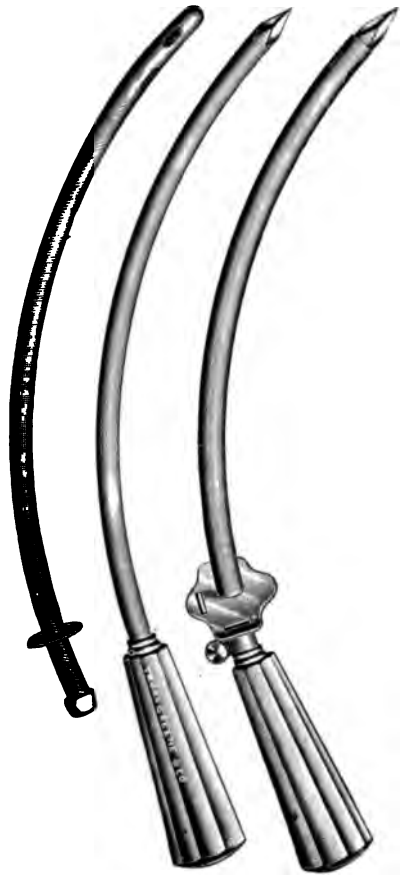


Fig. 15.

ting of the urethra and suturing of the cut edges of the mucosa and skin. Others incise the urethra

longitudinally and insert a small triangular flap of skin or mucosa between the edges. The method of Carl Beck, of New York, is perhaps more de-

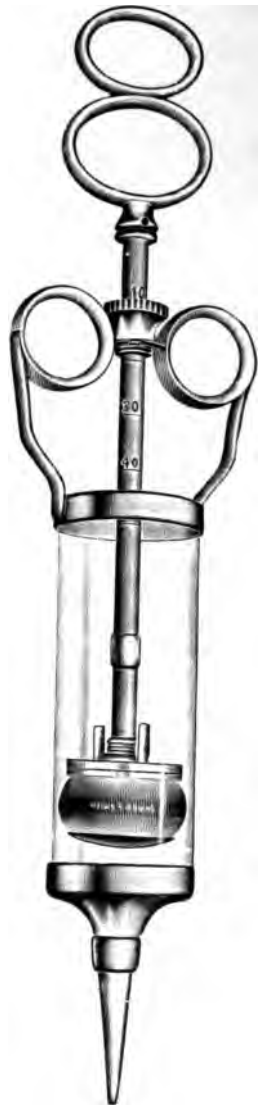


Fig. 16.

sirable for these cases and the only suitable one for a mild case of penile hypospadias.

Fig. 18. Second step

Fig. 19. Third step

"Taking advantage of the extensibility of the urethra and of its abundant blood supply, it accomplishes its purpose by isolation and forward dislocation of the canal. The operation is started by introducing a thick catheter as large as possible into the urethra. As soon as the bladder is reached, the opening of the catheter is temporarily closed. Now a thick suture is carried through the

Carl Beck Method

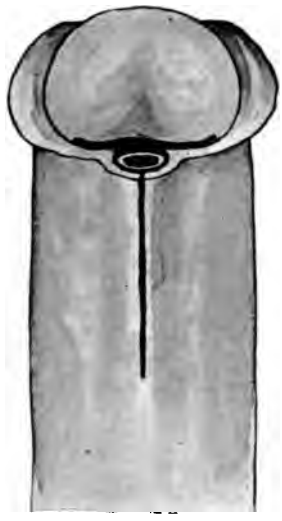


Fig. 17. First step.

wall of the catheter as well as the orifice with a fine curved needle. The suture, after being knotted, is left long, so that it may be utilized later for fastening the urethral orifice at the tip of the glans. By pulling the catheter slightly the urethra is stretched to such a degree that the incision can be made with a greater amount of security and in the straight direction. In small infants great care must be taken in pulling so that tearing may be avoided. Sometimes, in cases of this kind, it is advisable to catch the tip of the glans with a small hook forceps, by the aid of which the

penis can be placed on the stretch by pulling on it, then by counter-pulling the penis is kept stretched until the isolation is completed. In forming the integumental flaps great care is also necessary, especially when small infants are concerned, the incision at first to be made superficial only. For isolating the urethra the catheter serves not only

Fig. 20. Fourth step.

as an handle, but also as a guide. It can easily be palpated through the urethral wall—in young infants it can even be seen through this wall—and the cautious operator is thus warned against incising it. The knife must not be directed against the urethra, but rather away from it, and it is preferable to risk removing portions of the penile tissue, thus increasing the hemorrhage, than to perforate the urethra. It is self-evident that the orificial portion, in order to serve the catheter as a hold, should remain as thick as possible. The suggestion of Bardenheuer and Martina to leave a small integumental portion there deserves grate-

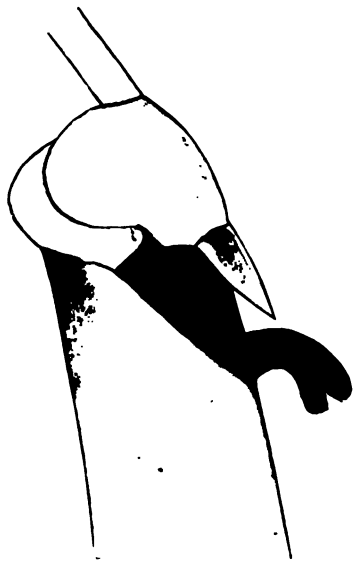


Fig. 21. Third step (older method)

Fig. 22. Fourth step (older method)

ful consideration. This is accomplished by circular ablation of a small portion of the skin around the borders of the opening. The catheter being removed previously to this step, the tunneling of the glans follows by a delta-shaped incision. In this wound-bed the liberated urethra is drawn up to the tip of the glans and there sutured to the edge." (*C. Beck.*)

The elongation of the urethra is only feasible in those cases of hypospadias in which the distance of the meatus from the tip of the glans is not too great, because the elasticity of the urethra, while surprisingly great, has its limits and

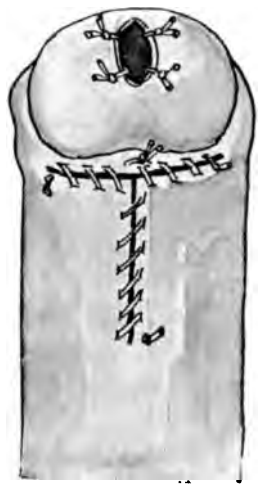


Fig. 23. Fifth step (older method).

undue tension will at least cause bothersome curvature and eventually even necrosis. However, the elasticity can be augmented by a liberal dissection and isolation as far down as the peno-scrotal junction. To guard against over-stretching due to insufficient isolation, it is necessary to convince oneself that the meatus can easily be brought forward to the tip of the glans. A few fixation su-

tures through the corpus spongiosum and the skin, and interrupted sutures uniting the median incision, close the operation. No after-treatment is required.

The Beck operation has the advantage of not producing a wound which is in immediate contact with the urine, except at the meatus—where it is of no consequence,—and of avoiding urine infiltration, because the urine passes through the normal canal.

EPISPADIAS.

Two Leading Methods of Operating

The best operative results are noted in epispadias of the penis, and there are two among the various methods given that may be regarded as especially successful. The simplest one is the formation of a new canal from the tip of the glans to the urethral orifice, and the closure of this canal by sutures in the median line. The prepuce, which, in these cases, is usually very large, is utilized to cover the dorsal surface of the penis with normal integument. The closure of the epispadic opening is reserved for a second stage. It is accomplished by freely vivifying and approximating its edges.

The second method, the plastic closure of the defect by the formation of flaps, utilizes the inverted skin of the penis, and the scrotal integument respectively, for the formation of a new urethra and to cover the top of the latter. The details of the operation are considered of less interest to the general practitioner than to the specialist and are, therefore, omitted.

ABNORMAL INSERTION OF THE URETER IN THE URETHRA.

Abnormal insertion of the ureter in the urethra is a very rare occurrence. Several years ago the author observed one case in a young girl who had been treated, and finally operated upon, for incon-

tinence. Through the cystoscope only one ureteral os was seen, the other was exposed in the urethra, near the vesical neck, by means of the urethroscope. Posner has recently reported a similar case.

Ureterotomy and new implantation of the ureter in the bladder would be the only way to remedy the defect.

URETHRAL AND PERIURETHRAL ABSCESS.

Rest

Heat

In acute cases rest in bed and the application of heat (dry or moist) to the parts involved will frequently suffice until the abscess opens through the outside or into the urethra. If this does not occur within a few days, the abscess should be incised from without and treated antiseptically. The fistula resulting from it frequently closes spontaneously or may be closed by excision of the fistulous canal and suturing of the wound, care being taken not to include the mucosa in the suture. If strictures, which usually accompany the abscess and which are situated in front, are not divided at the time the abscess is opened, fistulous formation is invited.

Incision

Fistula

In periurethral abscess a free incision should be made over a grooved director introduced into the urethra, the stricture, or strictures, divided, and a large-sized rubber catheter (No. 26 Fr.) passed and left in the bladder for five days.

Chronic urethral abscess requires operative treatment when it becomes acute or when its symptoms (urine dribbling, persistent suppuration and urethral irritation) annoy the patient so much as to call for relief. The author frequently destroys these small abscess cavities by the galvano-cautery applied through the urethroscope.

Chronic Abscess

Galvano-Cautery

ULCERS, FISSURES, FOREIGN BODIES, NEOPLASMS IN THE URETHRA.

These lesions, the extent of which, with few ex-

ceptions, can only be ascertained through the urethroscope, can also be successfully treated in

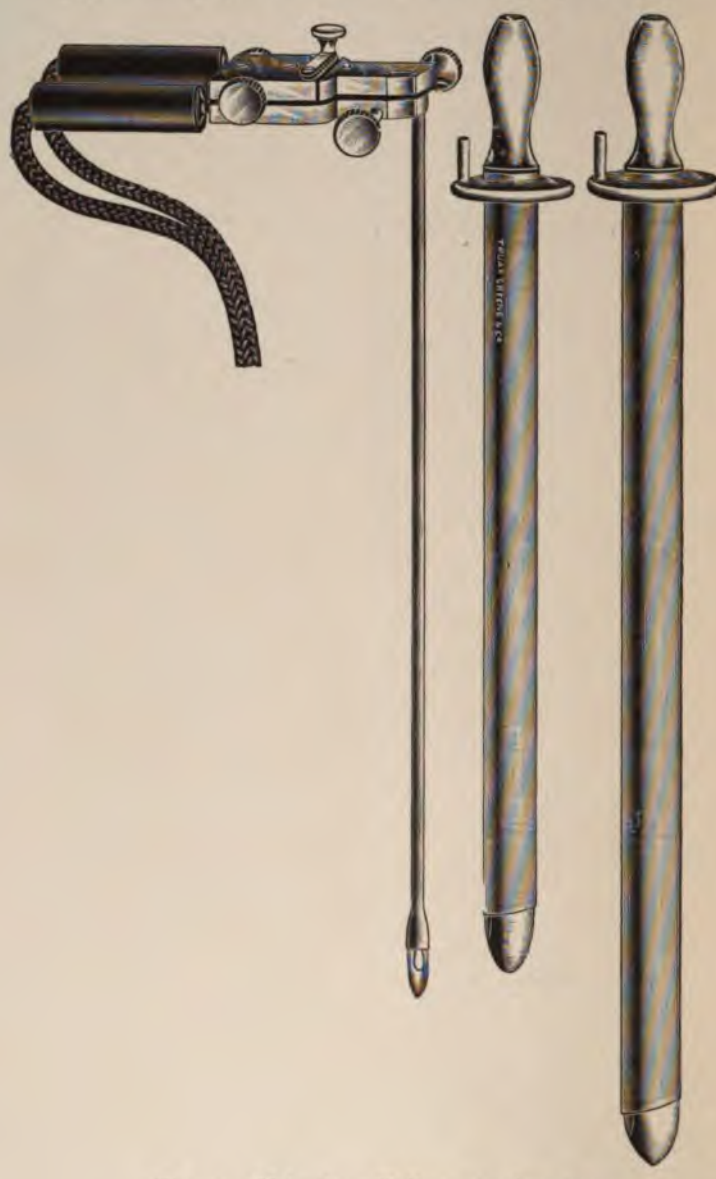


Fig. 24. Valentine—Kollman urethroscope.

Local Applications

the same way. Milder forms of ulcerations, erosions, and fissures will yield to topical applica-

tions with astringents or dilute caustic solutions, such as sulphate of copper, ten per cent; silver nitrate, ten to twenty per cent; chromic acid, four to ten per cent; resorcin glycerin, 1 in 5 to 10.

Instruments required. 1. An ordinary urethroscope tube of at least No. 26 Fr. caliber, or a

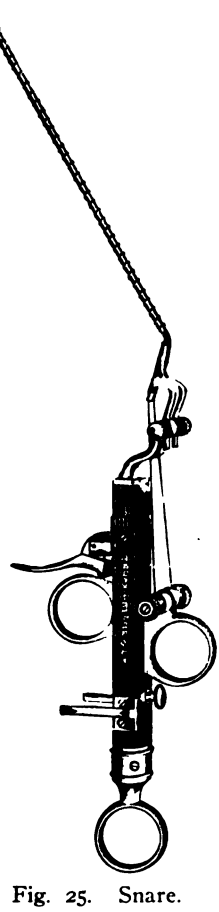


Fig. 25. Snare.

bivalve urethral speculum which is introduced closed and gradually opened to the caliber necessary to well expose the lesion.

2. A number of applicators, wooden sticks or metal rods at least eight inches long and one-eighth inch in diameter, or, still better, metal ap-

plicators so bent that free vision is not interfered with. The end of these applicators carries a small cotton swab.

The lesion, after being exposed in the tube or speculum, should be cleansed with a cotton swab saturated with a mild antiseptic solution (boric acid, dilute peroxide of hydrogen, sublamin 1:2,000), wiped dry with another swab and the medicated solution then applied by a third one. Another dry swab removes the remaining part of

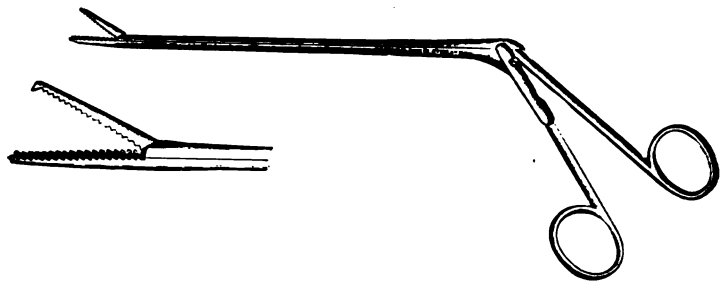


Fig. 26. Urethral forceps.

the liquid, whereupon the tube is withdrawn and a piece of gauze placed before the meatus.

Curetting and Cautery

Chronic and stubborn lesions require multiple linear incisions, curetting, or the active cautery, or both, and subsequent intraurethral medication in the nature of small injections, or, better still, urethral bougies. The vehicle for these bougies is cocoa butter, or preferably gelatine, the latter being manufactured in different per cent. strengths and ready for use. Mostly employed for this purpose are five to ten per cent. iodoform and iodol bougies, also sulphate of zinc, resorcin, ichthyol and sulphate of copper bougies.

Medicated Urethral Bougies

Urethral neoplasms may be removed by snares (hot or cold, as the case may require), torn off with the urethral forceps or cut off with scissors, and the bases, if excessive bleeding should demand, cauterized like an ordinary ulcer. These

hemorrhages, however, are, as a rule, easily controlled by a compressing bandage, or glutol powder applied to the bleeding surface through the urethroscope.

Very small papillomata are best made to disappear by touching them with the fine point of a galvano-cautery, or with pure lactic acid, or with six per cent. chromic acid. If these small growths happen to extend over a large area of the mucosa, the latter method is preferable, because multiple cauterization is likely to be followed by extensive cicatrization.

Sessile Tumors

So-called sessile tumors, having a broad base,

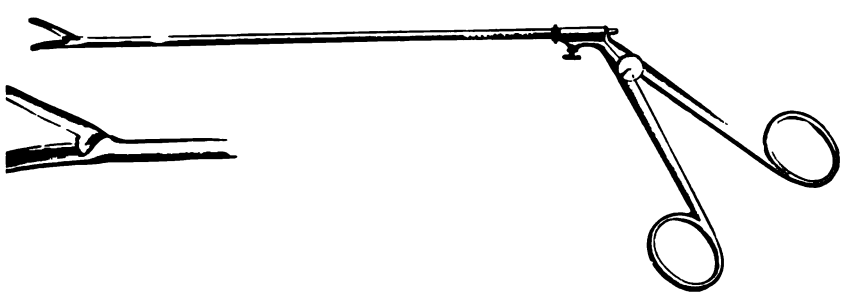


Fig. 27. Urethral forceps.

may be conveniently and safely removed when benign by external urethrotomy, excision of the growth and closure of the wound. The incision and excision should be made in the longitudinal axis of the canal. If the growth is malignant and not too far advanced, the radical operation—amputation of the penis and implantation of the urethral stump in the perineum (urethrostomy) is indicated. (Technique will be found in the section on *Malignant Tumors of the Penis.*)

External Urethrotomy

If a foreign body in the anterior urethra cannot be readily removed by outside manipulations from behind forward, or through the urethroscope; if there is danger of lacerating the tissues or pushing the body farther back by any of these

Needles

procedures; then it is safer to extract it through an external urethrotomy. A needle can be removed from the anterior urethra by piercing the penis with its sharp point, turning the remaining part towards the orifice in the canal and withdrawing it from there with a forceps. When a

Foreign Bodies in Deep Urethra

foreign body is lodged in the posterior urethra, near the vesical neck, an attempt should be made to push it back into the bladder with a sound of large caliber, wherefrom it will sometimes be readily eliminated by the act of urination (as is frequently observed in little concrements—renal and vesical calculi). Occasionally this procedure

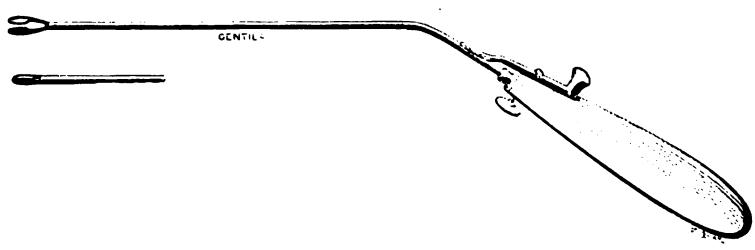


Fig. 28.

will have to be repeated several times to obtain the desired result. If, however, this should fail, the offending body may be treated like other foreign bodies in the bladder, viz., removed with a lithotriptor or by cystotomy.

TUBERCULOSIS OF THE URETHRA.

The most important part of treatment is the hygienic and dietetic, as adopted in the management of general tuberculosis. However, some good may be accomplished by local and surgical

Creosotal

measures. Creosotal taken internally in doses of ten to twenty-five drops, three times daily, is helpful in hemorrhages and tenesmus. In mild cases confined to the anterior urethra an injection of

Gomenol Oil Bichloride Iodoform

bichloride of mercury, 1:5000, or a two per cent. iodoform suspension or ten per cent. gomenol oil,

once every day, will materially assist the internal medication. In tuberculosis of the deep urethra the application may be made with a Keyes, Guyon

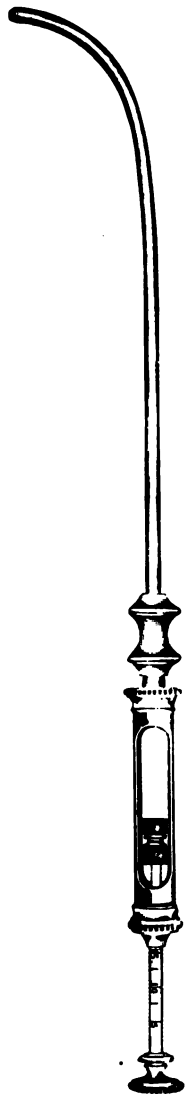


Fig. 29. Ultzman instillator.

or Ultzman instillator; not more than ten drops of the bichloride of mercury solution, or two c. c.

of the iodoform suspension, should be instilled. A tuberculous periurethral abscess should be freely opened and the cavity thoroughly cleansed, eventually curetted and loosely packed with iodoform gauze. Occasionally in cases of unilateral renal tuberculosis nephrectomy has a decidedly beneficial effect on the healing of the urethral lesion. Where such radical procedures are out of the question, continuous drainage by a perineal or suprapubic opening affords much relief.

Nephrectomy

Continuous Drainage

URETHRAL FISTULA.

The successful treatment of urethral fistula depends on its location, its etiology, and its extent. If traumatism is the cause there is frequently much destruction of tissue resulting in extensive cicatrization and distortion of the canal, which greatly handicaps surgical efforts to remedy the trouble. Especially stubborn are the urethrorectal and perineal fistulæ that have been frequently observed since perineal prostatectomy has become an operation of choice with many surgeons. If a fistula is caused or aggravated by tuberculosis or syphilis, operative steps will fail unless constitutional treatment or removal of the tubercular focus is successfully instituted; this is frequently demonstrated in unilateral renal tuberculosis where, after nephrectomy, an heretofore stubborn fistula readily heals with or even without further operative measures. Indeed, a fistula refusing to close in spite of all local procedures should induce one to ascertain whether or not there is a constitutional trouble back of it.

Tuberculosis and Fistula

In many cases a stricture in front of the fistula is the cause of its persistence. As soon as systematic dilatation deflects the flow of urine from the narrow fistulous into the widened urethral canal, the fistula closes. If there be considerable callous tissue around the fistulous canal, it is

Stricture and Fistula

necessary, after restoring the normal caliber of the urethra by dilatation, to remove such callus by excision and to close the new wound with a two-tier suture. If the fistula is of more recent date, curetting, with perhaps eventually cauterization, will be sufficient.

It is important in these cases to render the urine as inoffensive as possible by urinary antiseptics taken internally, and by vesical lavage with solutions the formulas of which will be found in the section on *Cystitis*.

Urethro-Vaginal Fistula

A very narrow urethro-vaginal fistula frequently closes after cauterization of the canal with a fine-pointed galvano-cautery, care being taken not to leave the cautery in the fistula for longer than a few seconds, as otherwise too much destruction of healthy tissue will be caused. Very large fistulous defects of this character require repeated plastic operations, the results of which are not always gratifying.

Cautery

Plastic Operation

PROLAPSUS OF THE URETHRA.

Replacement

Prolapsus of the urethra is a very rare occurrence and is found only in the female. In recent cases it will occasionally suffice to return the prolapsed tissue with the finger or a metal bougie, and to keep the patient in bed for a few days; a catheter left in the bladder during this period will assist in preventing a recurrence. Local lesions which may be associated with the trouble require proper attention.

Cauterization

In other cases cauterization with a nitrate of silver pencil, or the galvano-cautery, is helpful. As in the latter procedure cicatrization is the necessary consequence, the cautery should be applied in from four to six different places parallel with the longitudinal fibres of the canal in order to prevent stricture formation.

Excision

A prolapse of the size of a cherry or larger is

not amenable to this treatment; it must be excised. To prevent retraction and subsequent difficulty in finding the upper edge, two guide-loops of very fine silk threaded in a thin, straight intestinal needle are laid through the base of the tumor, one from left to right and the other from below above. The tumor should be removed in front of these loops with knife or scissors and the loops utilized to close the wound.

Cystitis

The after-treatment consists in rest in bed for a week, with antiseptic dressings between the labia. In the presence of cystitis a catheter may be tied in the bladder for a few days, and the latter daily irrigated with a mild antiseptic or astringent solution, while internally five grains of urotropin in half a glass of water are given twice daily.

URETHRAL CARUNCLE.

Importance of Removal

Caruncles occuring in the femals urethra should be removed by all means since they entail long-continued suffering from pain, bleeding and general nervousness and because of the possibility of a developing malignancy due to the constant irritation of the ulcerated tumor.

Surgical Treatment

The treatment, which of course can only be surgical, consists in excision of the growth. If pedunculated the pedicle is stretched by seizing the growth with forceps and cut off close to the urethral mucosa. The resulting wound is closed with a few fine catgut-sutures. A sessile caruncle should be excised well below its base and the wound closed with sutures. If the tumor be situated higher up in the urethra, which is quite rare, it should be made acessible through the urethroscope, but more practical is the temporary division of the urethra.

An exulcerated prolapse of the urethra should not be mistaken for a caruncle.

TRAUMATIC INJURIES OF THE URETHRA.

The management of these injuries depends on their location, the degree of the lesion and the severity of the symptoms—hemorrhage, infiltration, and retention of urine.

Slight Injuries

Very slight injuries without urinary retention and with very little bleeding are treated by rest in bed and local antiphlogistic applications. However, before discharging such a patient, and not later than eight days from the date of the injury, the urethra should be explored with a metal sound or a bougie a boulé of large caliber (No. 30 Fr.) to ascertain if the same has become constricted by submucous infiltration or cicatrization of the superficial lesion in the mucosa, in which event dilatation may be commenced at once and continued at two-day intervals until the normal caliber of the urethra is restored.

Necessity of Exploration of Urethra Before Discharging Patient

Severe Injuries

In the event of profuse hemorrhage or extensive swelling of the perineum, prolonged endourethral manipulations—the passing of bougies for exploration, or a catheter—are harmful, and catheterizing for the relief of urine retention with a soft rubber catheter of large size (not less than No. 24 Fr.) should only be attempted once. If this fails suprapubic puncture is much the milder procedure and has the advantage of draining the urine away from the lesion, thus lessening the danger of urine infiltration. The perineal swelling, due to extravasation of blood or of blood and urine, should be freely incised; the urethra entered by the incision; the cavity cleansed of blood clots; all bleeding checked and an attempt made to find and unite the ends of the canal, at least partly. A large-sized rubber catheter (No. 30 Fr.) is passed through the opening in the urethra and thence on into the bladder where it is left for a week. The remaining cavity is pack-

Suprapubic Puncture to Relieve Retention

Retrograde Catheterization

ed with gauze. If the urethra be completely severed for a distance, but both ends be found a Nélaton catheter should be introduced through the meatus, passed out of the proximal end and into the bladder through the vesical end. The wound is cared for in the same manner as above. If it is found impossible to pass a catheter, on account of extensive tissue destruction and swelling, suprapubic drainage with retrograde catheterization is the operation of choice. If the latter procedure be decided upon, the bladder should be opened suprapubically in the typical manner (described in the article on *Prostatectomy*), the retrograde metal sound inserted in the vesical orifice of the urethra and passed downwards until its tip appears in the perineal wound. A Nélaton catheter, No. 26 Fr., is then tied to the perforation close to the tip of the sound, which is drawn backwards until the catheter has reached the bladder. The sound is now separated from the catheter; the bladder closed by two rows of Lembert sutures and the catheter secured at the perineum by a silkworm-gut suture.

In all these cases dilatation of the urethra with metal sounds should be started within a week after removal of the drainage tube and continued until normal conditions in the urethra are restored.

Treatment of Urethro-Vaginal Fistula

Injuries of the female urethra are frequently due to traumatism or instrumentation during labor. They are usually not so extensive as the traumatic kind in the male, but occasionally lead to urethro-vaginal fistula and should be treated accordingly; if very recent, by curettage or cauterization; if surrounded by callus, by excision of the fistulous canal, suture of the defect in two layers, and a catheter tied in the bladder for five days. In performing the incision, which should be made in the shape of a triangle, the base of

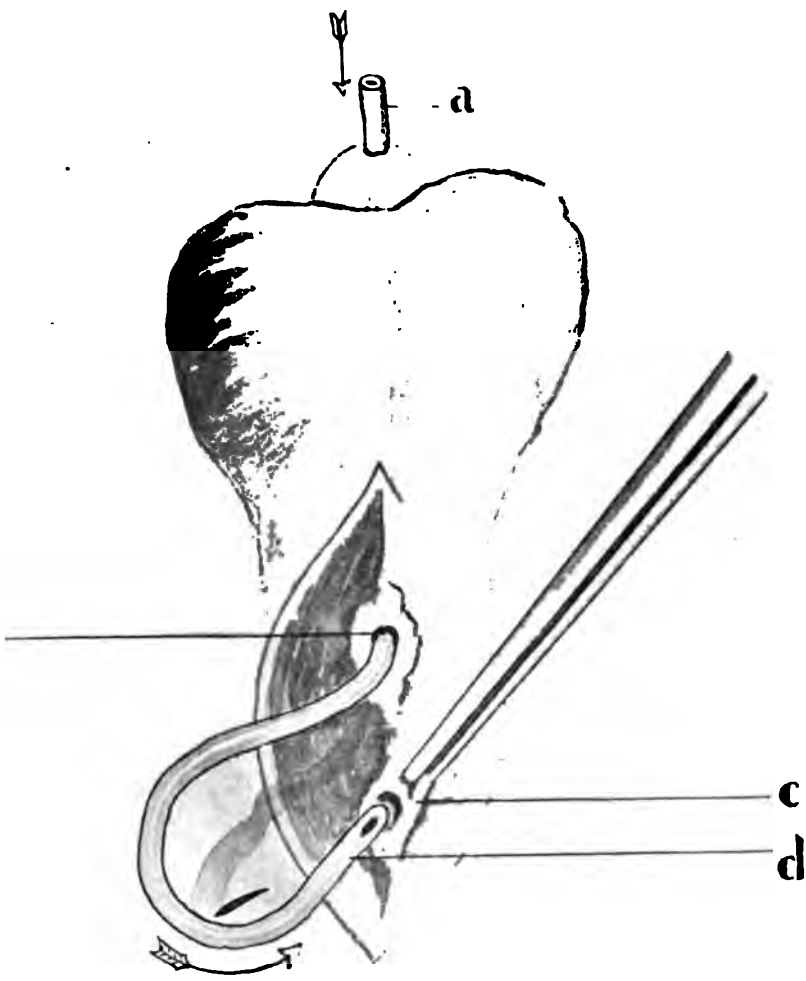


Fig. 30. — Catheter in urethra, its [illegible] distal or vesical end, [illegible] enter vesical end.

the triangle faces the vagina and the apex is directed toward the urethra. When placing the sutures care must be taken not to include the vesical mucosa.

Injuries Due to Faulty Instrumentation

Injuries in the urethra produced by instrumentation differ in no respect from those caused by traumatism from without. If found in a structurally healthy urethra, an expectant method of treatment will suffice. In case of urine infiltration and retention, as frequently observed in a pathologic urethra, the same rules apply as given above, viz., establishment of free drainage for the infiltrated tissues and relief of the urinary distress in the manner described. An attempt should be made to pass a large rubber catheter over the rent into the bladder—small instruments invariably drop into the pockets—and if this is not readily accomplished it is better to resort to surgery instead of injuring more tissue by futile manipulations. Almost always perineal urethrotomy and vesical drainage through this opening will be required; when this fails suprapubic drainage becomes necessary.

Catheters of Large Caliber

STRICTURE OF THE URETHRA.

Indications

The purpose of the treatment here is to reestablish free urination; to restore, so far as possible, the normal caliber of the urethra; and to remove the local and remote symptoms caused, or at least being aggravated by the obstruction. A complete restoration of the urethral texture will hardly be accomplished and the return to a normal caliber has to be assured by occasional revision and resumption of the treatment, even for years. The best results are obtained in recent, short and not deep-reaching strictures.

Secondary Lesions and Complications

The cure of secondary lesions and complications depends upon their severity and extent. Mild retrostrictural pathologic conditions are

readily checked by the successful treatment of the obstruction which causes or aggravates them. In far-advanced complications, especially in the ureter and kidney, improvement is often observed after removal of the stricture.

Methods

The methods of treatment commonly employed may be divided into:

A. Bloodless procedures.

B. Bloody operations.

Of the first mentioned we differentiate:

(1) Dilatation, and

(2) Electrolysis.

Of the second division the procedures are:

(1) Internal urethrotomy.

(2) External urethrotomy.

(3) Resection of the urethra with or without a plastic step.

No inflexible rules can be laid down as to the method of treatment. It is important, however, to remember that inflammatory and infectious diseases in the upper and lower urinary passages frequently accompany strictures, and that the non-pathogenic micro-organisms inhabiting the urethra readily assume a virulent character under traumatic provocations and other favorable circumstances. Therefore, proper elimination through the bowels, kidneys and skin must be provided, internal urinary antiseptics (such as urotropin) given, and the urethra and bladder irrigated with antiseptic solutions before any treatment of stricture is begun.

Importance of Antisepsis and Asepsis

Care for Elimination

Local Effect of Dilatation

The majority of strictures are amenable to *dilatation,* and the best and most lasting results by this method are observed in more recent inflammatory lesions. Dilatation with metal bougies in these cases has not only a mechanical, or stretching effect, but it also promotes absorption of the soft infiltrations and, in this way, a restoration to normal conditions supervenes.

This treatment furthermore has the advantage of not detaining the patient from his usual voca- **Advantages**

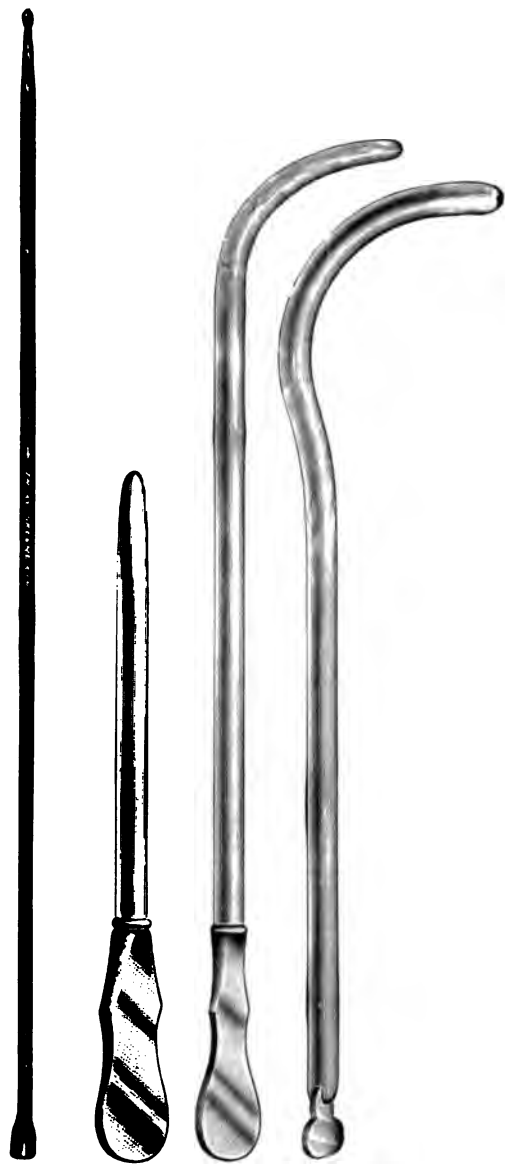


Fig. 31.

tion, although it may extend over a period of many months.

Dilatation is not satisfactory in very dense strictures with much cicatricial tissue, nor in a number of strictures complicated with fistulæ or much periurethral callus. Under these circumstances the effect is only temporary.

Dilatation is contra-indicated, when, in spite of all precautions, the treatment is very painful or followed by hemorrhage and fever.

Elastic Bougies for Strictures of Small Caliber

Strictures of small caliber (less than No. 15 Fr.) may be dilated with conical, probe-pointed *elastic* bougies, as the passage of metal bougies enhances the danger of extensive tissue lacerations and false passages.

Metal Sounds for Strictures of Large Caliber

Stricture of a caliber of from Nos. 16 to 30 Fr. are best treated with metal bougies. The dilatation should be very gradual and, for this reason, the author prefers the Béniqué scale to the French, the former being a subdivision, so that, for example, No. 16 Fr. equals No. 32 Béniqué, and No. 30 Fr. is identical with No. 60 Béniqué. The advantage of this subdivision is obvious. The dilatation from a given size to the next higher size, being just one-half of the French scale, is consequently very gradual, less perceptible and, therefore, a milder procedure, not alone so far as the sensitiveness of the patient is concerned but also with respect to the integrity of the tissues.

Urethral Dilators for Strictures Above No. 31 Fr.

Strictures of large caliber, above No. 31 Fr., the favorable location of which is in the bulbous urethra, should be treated with expansible instruments especially designed for this purpose—urethral dilators.

When using elastic bougies or metal sounds a size should be selected which will pass through the stricture without the employment of force or causing laceration of the tissues. Our judgment is assisted by the preceding exploration and de-

termination of the caliber of the stricture. The first bougie (which, of course, must be well lubricated) to be passed should be one size larger than that of the stricture and it should be withdrawn within a few minutes. At the next treatment (not sooner than two days) the same number should be introduced and withdrawn and the next higher number passed and left *in situ* for five minutes. In the same way we proceed at every following *sitting* until an elastic bougie of No. 16 Fr., or No. 32 Béniqué, is introduced without difficulty. From then on metal bougies should be used which should be passed with utmost gentleness, avoiding unnecessary pain, bruising or actual lacerations.

Technique.—The patient should be placed in the recumbent position, the knees separated and slightly flexed. The operator stands at his left side holding the penis of the patient between the fingers of his left hand, putting it slightly on the stretch with its dorsum facing the abdominal wall. The sound, well warmed and lubricated, is held in the right hand in a line with Poupart's ligament, and in this position is gently inserted into the urethra as far as the "cut-off" muscle (external sphincter). The handle is kept low to avoid the point of the beak being caught in the upper wall of the triangular ligament. Upon arriving at the latter, the handle should be brought to the median line of the body, and the shaft elevated, by which movement the point is made to pass through the sphincter muscle into the membranous urethra. This step in the manipulation can be facilitated by placing the fingers of the left hand against the root of the bulb where they act as a fulcrum for the curve of the instrument.

By further depressing the handle until the

shaft is nearly on a line with the thighs, the point glides over the prostatic urethra into the bladder, where its arrival is demonstrated by the free motion of the tip of the instrument when the handle is rotated, and by the shaft remaining in the median line when left to itself. This should be borne in mind when dealing with cases in which false passages, pockets and diverticuli in the deep urethra are met with. It should also be remembered that the floor of the bulbous urethra near the external sphincter is very loose and movable and in elderly men forms quite a large pouch in which the point of the bougie or other instruments might become engaged below the external sphincter instead of passing it. It also happens that the point occasionally catches in the triangular ligament above the sphincter if the handle is lifted too soon before the point has fully arrived at the entrance to the membranous urethra.

Procedure in Difficult Cases

In the event of any of these difficulties the instrument should be withdrawn for an inch or more and, by raising or lowering its tip, the complete introduction will then usually be accomplished.

Danger of Cocainization

Under no conditions should cocain be used as a local anesthetic, or to overcome a supposed sphincter spasm, at this stage of the procedure, for the above-mentioned manipulations are more than likely to cause epithelial abrasions through which rapid absorption of the drug occurs, followed by alarming, if not fatal, intoxication. The better plan in such a difficulty is to desist from further attempts at that sitting, and apply cocain ten minutes before the next treatment is begun.

Methodical Dilatation

To promote absorption, aside from the results of stretching, the metal bougies should remain

in situ for from ten to fifteen minutes before they are withdrawn. Here we follow the same plan as with elastic bougies, viz., of increasing the sizes at successive treatments. When two sounds are used we leave the first and smaller size, which was used at the previous sitting, in the urethra for a minute or two, then withdraw it and pass the next larger size, which is allowed to remain for from ten to fifteen minutes. But it should be remembered that as we arrive at the larger sizes of metal bougies (Nos. 25, 26, 27, 28, 29, 30) in a course of treatment, it will be found that in many strictures, especially those with much cicatricial tissue, we shall be compelled to change this system and use but one bougie of the same size at several successive sittings before we may safely, and without undue force, proceed to the next higher size. It will also be necessary to increase the intervals between treatments to four or five days as soon as we reach a caliber of No. 25 Fr., for with the increased caliber of each succeeding bougie the subsequent reaction increases proportionately, which must be given reasonable time to subside before another attempt to dilate is made. Disregard of this rule often leads to severe inflammation, periurethritis and new infiltrations at the expense of losing all that has been gained by the preceding dilatations.

In treating strictures of the anterior urethra it is quite unnecessary to pass bougies into the posterior urethra or the bladder unless the strictures are situated in the bulbous portion close to the external sphincter; in all other cases of this kind it is better to use short, straight, conical sounds having a shaft between five and six inches long.

Reactive Swelling

The reactive swelling of the mucosa following the dilatation, especially in strictures of small

caliber, may lead to strangury, and even urine retention, which is best relieved by a suitable catheter tied in the bladder and left there for twenty-four to forty-eight hours. This has the advantage of a continuous dilatation by which the more or less unyielding stricture tissue becomes so much softened that bougies of a caliber from four to six sizes higher than the last one passed can be readily introduced following the withdrawal of the catheter. This method is also utilized for the management of strictures of very small caliber, which barely admit a filiform bougie.

Continuous Catheterization in Strictures of Very Small Caliber

In the absence of retention and alarming symptoms, repeated attempts to enter the bladder with a filiform bougie may be made, which usually are successful.

These attempts may be assisted by rest, hot Sitz baths, hot fomentations applied to the perineum and the under surface of the penis. This usually suffices to reduce the hyperemia in and around the stricture. Also useful for the same purpose is an urethral injection of 2 to 4 c. c. (3ss—3i) of adrenalin, 1 in 4000. By closure of the meatus with the fingers of the left hand the liquid may be squeezed backwards with the right to and also through the stricture. General anesthesia might be required, especially in strictures at the triangular ligament when the contractions of the external sphincter form an additional obstacle. If finally the bougie is passed it should be tied in the bladder for twenty-four to forty-eight hours, after which time it will be found that at least a bougie of small caliber, or a catheter, may be introduced. The presence of a filiform bougie in such a stricture does not interfere at all with the passage of urine, which escapes alongside of it.

Adrenalin to Reduce Congestion

In the continuous efforts of the detrusor muscle to overcome the steadily contracting obstruction, this muscle ultimately becomes exhausted to such a degree that a sudden congestion in and around the canal, aided by a plug of mucus or pus lodged therein, is sufficient to produce com-

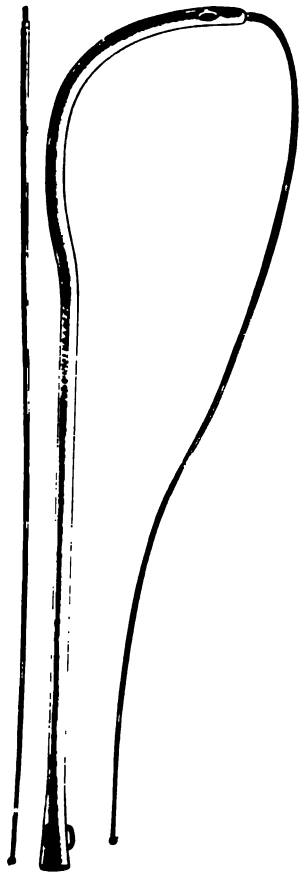


Fig. 32. Catheter and guide-bougie.

plete retention. When in such a case the bougie has entered the first portion of the stricture but its passage through it is impossible oftentimes urination follows its withdrawal. The bougie apparently reduces the congestion and removes the obstructing plug.

Catheters with Guide Bougies in Filiform Strictures

By connecting a filiform bougie with an elastic or metal catheter of small size it is also possible, without risking a false passage, to rapidly relieve urine retention caused by very narrow strictures. In the same manner such strictures if not too dense can be rapidly dilated to a caliber where ordinary bougies may be passed without

Fig. 33. Metallic sound and guide-bougie.

difficulty. This is accomplished in the following way. After the filiform bougie has been introduced into the bladder an elastic bougie or a metal sound, No. 6 Fr., attached to and guided by

the filiform, is passed through the stricture, left there a minute or two, then withdrawn and detached from the filiform. In the same manner

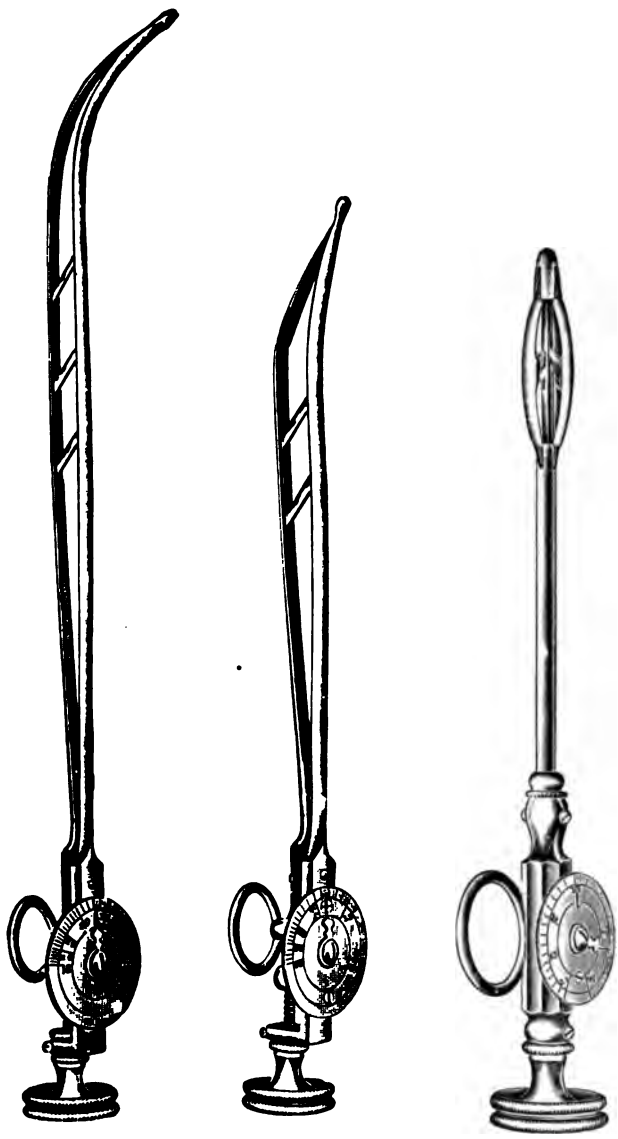
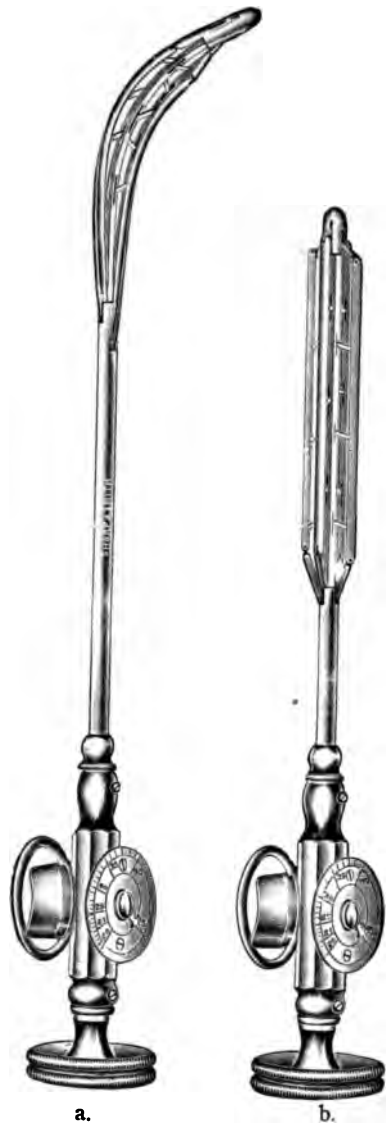


Fig. 34. Fig. 35. Fig. 36.

Fig. 34. Urethral dilator, Oberlaender, slightly curved.
Fig. 35. Author's modification, short model.
Fig. 36. Author's instrument for dilatation limited to the bulbous urethra.

tunnelled bougies or metal sounds Nos. 7, 8, 9 and 10, one after the other, are used, when an ordi-



a. b.

Fig. 37. a. Kollman dilator, four-bladed, for the posterior urethra. b. Same for anterior urethra.

nary bougie or catheter will be found to pass through the stricture without difficulty.

Urethral Dilatation with Expansible Instru-

ments. These instruments are employed in strictures of very large caliber, above No. 30 Fr., where the immediate passage of sounds of such caliber would necessarily cause much traumatism and pain at the meatus and at the external sphincter. Oberlander's and Kollman's dilators are the best and most suitable types used for dilatation of the anterior and posterior urethra. (The technique of this form of dilatation will be found under *Chronic Urethritis.*)

Electrolysis

Electrolytic Treatment. Experience has proven that very recent, soft infiltrations will become absorbed by the judicious employment of electrolysis; but dilatation gives the same results even though it requires a little more time. Organized strictures cannot be permanently removed by electrolysis; they require other methods of treatment. It may be said, however, to the credit of electrolysis that strictures which answer to every dilatation with urinary fever frequently seem to be benefited by electrolysis to the extent that dilatation can be resumed without this unpleasant incident.

Technique

Instruments Required. Newman's electrodes, of different sizes, in the shape of bougies with isolated shafts and conducting, olive-shaped tips; a large sponge electrode of at least six inches diameter; a galvanic battery with a good galvanometer and two conducting cords. The sponge electrode connected with the positive pole is placed somewhere on the body. A bougie, the selected caliber of which should be four sizes larger than that of the stricture, is introduced into the urethra until the tip of the olive, or the conducting button, touches the obstruction, against which it is held by slight pressure. A current of not more than five milliamp. is closed and kept up for five to ten minutes, within which

time the button, if at all, will pass into and through the stricture. This will be felt as a distinct jerk. It is then slowly withdrawn and, after it emerges from the stricture, the current is broken. The treatment may be repeated in two weeks. Currents stronger than the above named

Fig. 38.

should not be employed because of their corrosive effect.

Reactive Swelling

The application of electricity in this manner is followed by a reactive swelling in and around the stricture lasting for from two to four days. The difficulty of urination associated with this reac-

tion is of little consequence in strictures of large caliber, but it must be taken into account when strictures of small caliber are subjected to this treatment; in these cases even complete retention might occur which can be avoided by tying a catheter in the bladder for forty-eight hours.

Internal Urethrotomy

Internal Urethrotomy. Internal urethrotomy is performed either to effect a cure by the operation alone, or by it along with and subsequent dilatation, where dilatation for reasons stated previously has failed or does not promise results without a preceding cutting operation, or where dilatation is contra-indicated. It should never be performed in the posterior urethra and not in the anterior urethra during a virulent gonorrhea, unless it be for very urgent reasons.

Indications

Precautions

Here, like in all the operations on the urinary tract, the latter is to be thoroughly disinfected before the operation. If there is a suspicion or any evidence whatever of infection in the urethra, bladder or kidney, the urethra and bladder should be irrigated with mild antiseptic solutions for several days preceding the operation, and urotropin given internally. The bladder should also be irrigated immediately before the operation and four ounces of the antiseptic fluid left therein.

Internal and Local Antisepsis

To perform urethrotomy successfully the following points should be noted:

Conditions Required for Successful Operation

1. Exact determination of the location, extent, nature and caliber of the stricture or strictures.
2. A thorough division of all constricting fibres and the callus.
3. The cutting of normal tissues of the urethra behind or in front of the stricture, or into healthy parts of the corpora cavernosa, should be avoided.
4. The use of instruments devised or modified

by the author, which will allow of an exact diagnosis and operation.

The proper instruments to determine the location, caliber, extent, number and character of strictures are the bougie a boulé and the author's localizer, each provided with a corresponding scale expressing in inches the position of the extremity within the urethra.

The bougie locates the stricture as to its distance from the meatus. The localizer determines its character and its position relative to the roof and floor of the canal, and with the certainty of establishing this latter point the old, much-ventilated question whether to operate at the floor or at the roof has lost its importance.

The localizer consists of a rod seven inches long, having a caliber of No. 14 Fr. At its distal end, concealed in a groove, is a thumb-like, probe-pointed device one-half inch long, attached by means of a hinge joint. By a screw gear in the pavilion of the shaft this thumb may be moved from its recess and the extent of its attained distance is gauged on a dial beside the screw.

Local Anesthesia

To anesthetize the urethra one c. c. of a two per cent. solution of cocain is injected and distributed over the mucosa by slight manipulations of the fingers from without. A ten per cent. antipyrin solution is not as effective as cocain, but yet preferable because an intoxication is impossible and profuse bleeding, as is observed following operations under cocain anesthesia, never occurs. This latter, however, can, to a certain extent, be overcome by adding adrenalin to the cocain. (Solution adrenalin, 1 in 10000,—10 gm. Cocain hydrochl. 0.2 gm.) In highly nervous individuals general anesthesia may be required.

Meatotomy, Preceding Urethrotomy

The meatus should be made passable for a bougie a boule, No. 31 Fr., before internal urethrot-

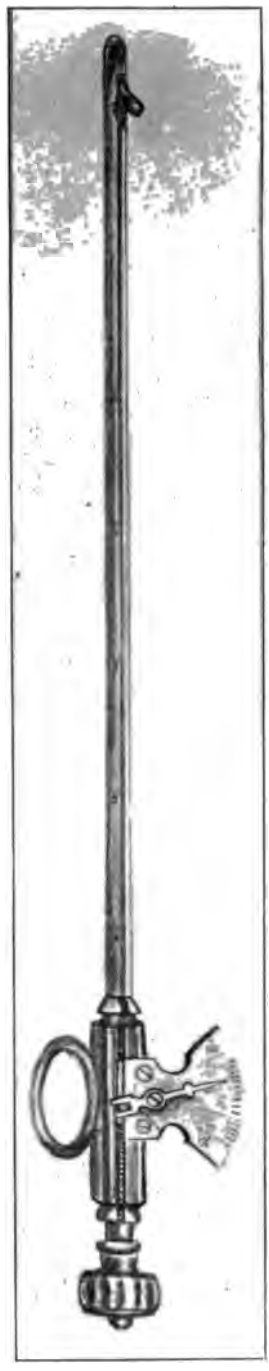


Fig. 39. Author's localizer.

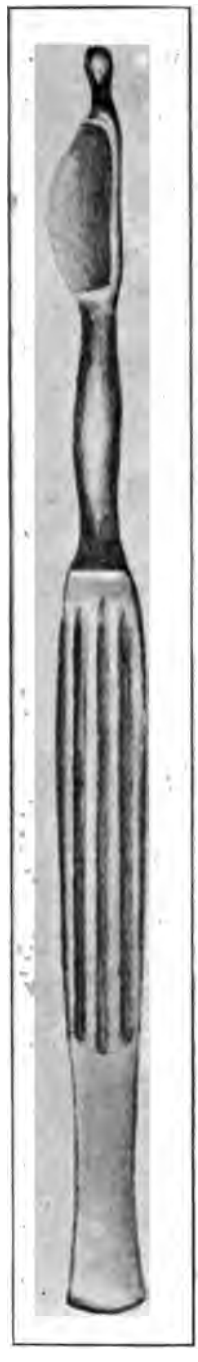


Fig. 40. Author's meatotome.

omy. To enlarge the meatus the author uses a very simple and most convenient meatotome. Its shape permits its safe introduction into and behind the orifice and the fossa navicularis, and the

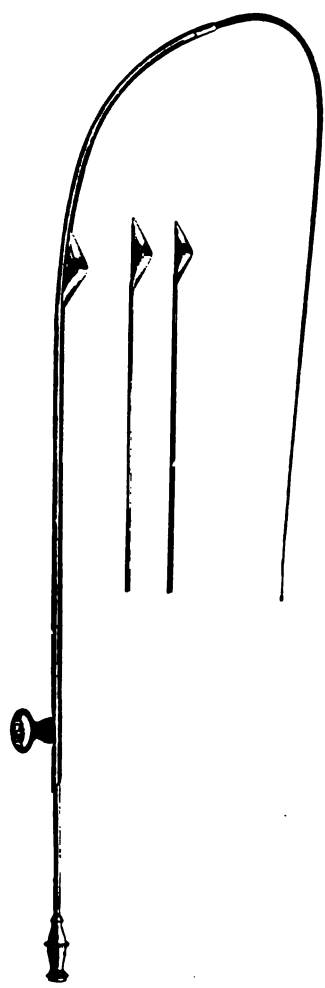


Fig. 41. Maisonneuve urethrotome.

division of the stricture fibres without unnecessary cutting of the glans, which latter is not involved in the process and should, if possible, be preserved intact. It carries a protecting metal

ball at its tip, and resembles a tenotome, but its belly is much more convex. The index and middle fingers of the left hand steady the glans, the meatotome is introduced in the urethra until the highest point of its belly has passed the stricture and then, under slight pressure against the latter, and counter-pressure with the fingers holding the glans, it is withdrawn, cutting from behind forwards. In strictures of very small caliber at the meatus, it can also be used to cut from in front backward. All strictures of the meatus should be divided at the floor of the urethra.

Urethrotomy From Before Backwards

Internal urethrotomy is performed with especially designed instruments called urethrotomes, some of which cut from before backwards; others from behind forwards. For the operation from before backwards, the Maisonneuve instrument is most popular and best suited. It consists of a filiform conducting bougie, which, by means of a screw tip, is attached to a grooved staff. The modern instrumentarium contains two shafts, one carrying the groove on its convexity, the other one on its concavity, the selection of either depending on the location of the stricture at the roof or the floor of the urethra.

The conducting bougie is passed into the bladder, the staff is attached to the guide and passed through the stricture, but not necessarily into the bladder. The staff must be held immovable in the median line by an assistant. The operator grasps the penis with the fingers of his left hand, pulling it upwards over the instrument. The blade is inserted with the right hand into the groove on the staff and pushed downward until it reaches and passes the obstruction, whereupon the whole instrument is withdrawn. The knob on the blade prevents injury to the normal tissues,

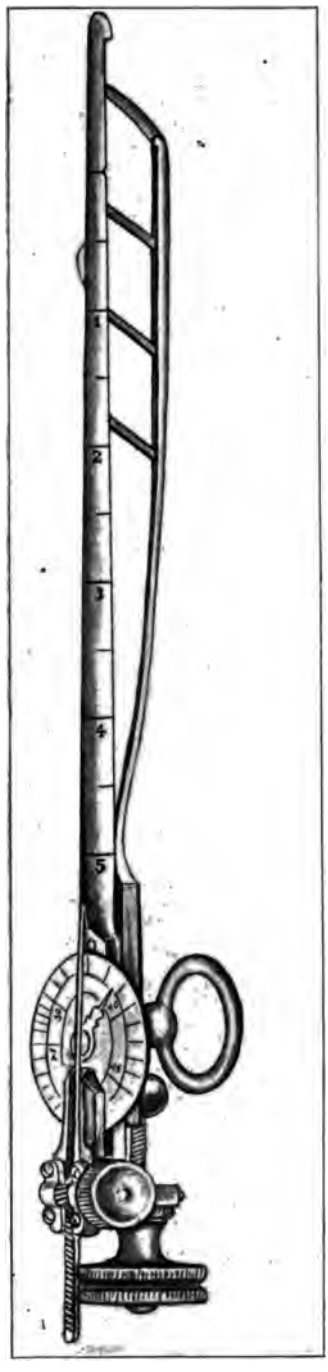


Fig. 42. Author's urethrotome.

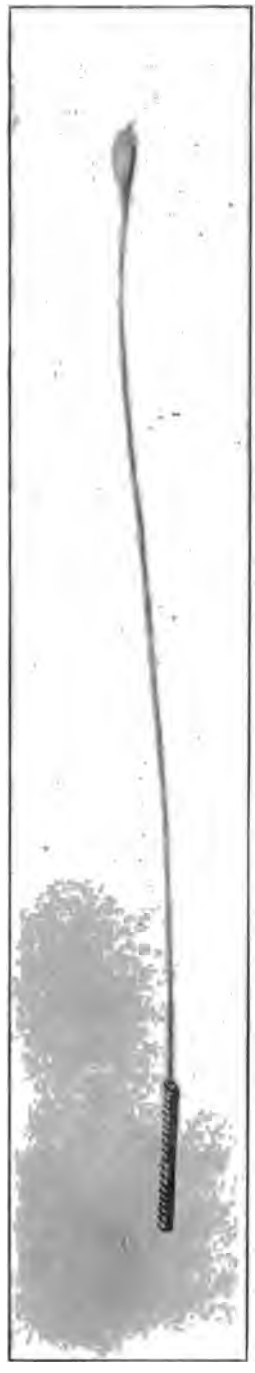


Fig. 43. Cutting blade.

which, in this way, are protected and pushed away.

Great care is required when using the Maisonneuve instrument in strictures of small caliber. It should not forcibly be introduced even though the filiform guide bougie be attached to its vesical end. The latter may become kinked and a false passage will be the result of further forcible attempts to pass the instrument. In the selection of the cutting blade one must be guided by the caliber of the stricture. For instance, a stricture of the caliber of No. 16 requires a blade not larger than No. 21 Fr. A larger blade used is likely to penetrate through the callus into the corpus spongiosum causing a very serious hemorrhage. If it should be found impossible to control such a hemorrhage by pressure it may be necessary to perform an external urethrotomy and pack the wound with gauze. In order to permit free drainage for the urine the incision must be made backwards from the bleeding point, the latter packed forward from the wound and a catheter inserted into the bladder.

Blade Should be Selected According to Caliber of Stricture

The Maisonneuve urethrotome is used for all kinds of strictures, but the author only employs it in dense strictures of very small caliber as a preliminary step to admit his own urethrotome to complete the operation. The latter instrument cuts from behind forwards, but also can be used in strictures of small caliber—not filiform ones—to cut from before backwards. As internal urethrotomy is only practical, successful and free from the dangers of hemorrhage and urine extravasation, if properly performed, in the first three and one-half inches of the anterior urethra, the author's urethrotome is made straight and short enabling the surgeon to use it without assistance. The shaft is provided with a scale

Author's Urethrotome

identical to that on the bougie a boulé and on the localizer, the difference being that the former indicates the distance of the cutting blade from the meatus. The instrument dilates the stricture before cutting, whereby complete division of every constricting fibre is insured. The bars are separated by means of a screw at the distal end and the amount of separation is registered on a dial below the screw. The blade, about two mm. high, runs guarded in a groove on the upper bar of the instrument. For the purpose of drawing the blade through the stricture, and only through it, its handle is constructed as follows: The smooth surface of the same is provided with a scale so that the mark coming first into view indicates that the blade has left its groove and that it has arrived at a point immediately behind the stricture. The succeeding marks corresponding to a millimeter division indicate, as they come into view, the length of the incision made. The advancing movement of the blade is brought about by a worm gear placed over the dial and consisting of a rack and endless screw engaging with the rack. One can readily understand that the extent of the incision may be accurately gauged according to the previously ascertained length of the stricture.

Technique

In an assumed case we would proceed in the following manner: We find, for example, with the bougie a boule, a stricture of No. 24 Fr. three inches from the meatus. We further find that the bougie upon slight pressure travels a quarter of an inch downward before it leaves the grasp of the constriction. Upon withdrawing the bougie we further find a certain elastic resistance to its removal. When we at this moment desist from further upward pulling, and palpate from without, we receive a distinct impression of the

thickness of the stricture, which indicates its extent towards or into the corpus cavernosum. So far we have obtained a good deal of information, but we do not know where to place the incision when operation is decided upon. To this end the localizer is introduced to a point immediately behind the stricture (here three and one-fourth inches from the meatus), which can be done with accuracy by reading the marking on its shaft. The thumb of the instrument facing the roof of the canal is pushed out of its recess and elevated until the hand on the dial indicates a caliber five numbers higher than the caliber of the bougie which has located the stricture, here, in our special case, it will be No. 29 Fr. Then traction is made on the instrument towards the meatus. If the globular end of the thumb passes on without encountering an obstruction or resistance, we have proof of the absence of an annular stricture or of one situated on the roof of the urethra. Now, after concealing the thumb in its groove and carrying the instrument back to its starting point, we turn the thumb towards the floor, adjust it in the manner described above, and by gentle traction as before, we at once feel the arrest of the globular end. We know now that there is a stricture of No. 24 Fr. caliber, one-fourth inch long, and three inches from the meatus at the floor of the urethra, and we also know the urethrotome has to be introduced so far that the cutting blade is placed three and one-eighth inches from the meatus in order to meet the stricture at once without cutting normal tissue. We also know that the blade has to travel one-fourth inch in order to divide the constricting tissue.

It is a good rule to stretch a fibrous stricture to about five sizes, a callous stricture to about

two sizes, above their previously ascertained caliber rather than to over-stretch, because if in a revision fibres or callus are found not divided, this can be accomplished immediately by a second incision. In such a revision the caliber will be found larger than before the first incision and the dilatation preceding the second incision will be accordingly higher.

It is important to place the knife one-eighth

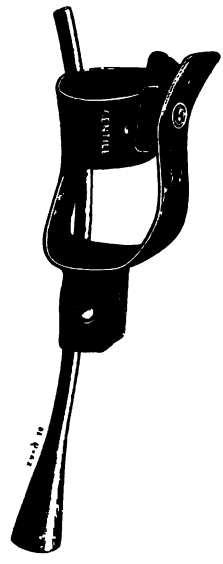


Fig. 44. Catheter-muzzle.

inch behind the posterior border of the stricture, especially in those of a large caliber, because in stretching the urethra we shorten its longitudinal axis which brings the blade closer to the stricture.

Medium Sized Catheters to Drain Off Urine

After the stricture has been fully divided, which is demonstrated by the passage of a No. 31 bougie a boule, a soft rubber catheter, No. 18 Fr., should be tied in the bladder and left there for two or three days—the length of time the patient should remain in bed. The bladder

may be irrigated twice daily with a mild antiseptic solution, and urotropin given internally.

Larger sized bougies should not be employed because they keep the edges of the wound separated and invite bleeding.

Under certain conditions, for instance a narrow meatus or a reactive swelling around the wound, the blood will flow into the bladder instead of outward, with the result that the catheter will be clogged by blood clots, the bladder become overdistended and the urine expelled alongside of the

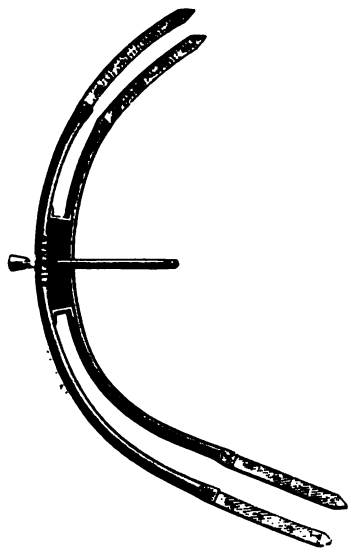


Fig. 45. Catheter fastener for female bladder.

catheter. At least a part of this urine will find its way into the wound and more or less severe urine infiltrations will be the inevitable consequence.

Immediate Effect of Urethrotomy

The idea of keeping the wound open and insuring a broad scar by selecting large size catheters is based on a misconception of the purpose and effect of internal urethrotomy. I have demonstrated that in strictures with little or no callus,

the wound caused by the incision is an elipsoid, which is gradually closed by epithelization. This form is produced by the action of the circular fibres of the urethra. In strictures with much callus the wound is more or less linear because of the absence of this action of the muscle fibres. In the first case the fibres provide the broad scar, in the second urethrotomy is not performed with this view but for reasons stated above.

Removal of Catheter

Before removing the catheter at the end of two or three days the bladder may be filled with 120 c. c. (℥iv) of 1 in 2000 silver nitrate solution and the same quantity irrigated all over the urethra while the catheter is being withdrawn. The patient is then ordered to empty the bladder.

Postoperative Hemorrhage

In the event of bleeding from the anterior urethra, which cannot be checked by compression from without, irrigation with large quantities of hot normal salt solution will be most useful. It should be remembered, however, that the fluid is to run through the catheter without any pressure. This may be accomplished by passing a Nélaton catheter (No. 14 Fr.) up to the external sphincter and lowering the irrigator sufficiently.

Postoperative Dilatation

The passing of metal bougies should not be commenced sooner than eight or ten days after the operation, for it is not necessary if the stricture be circumscribed in depth and length and if all fibres were divided in the operation; and it is immaterial whether dilatation begins eight, ten or fourteen days after operation in those cases in which the operation was performed because dilatation was for the time contraindicated (for reasons mentioned previously). In the latter class of cases dilatation should be kept up for a period of one-half to two years, or more.

When commencing dilatation after urethrot-

omy, we employ first bougies or catheters of a smaller size than the new caliber of the urethra. In this manner we avoid unnecessary pain, bleeding and eventually new scar-formation.

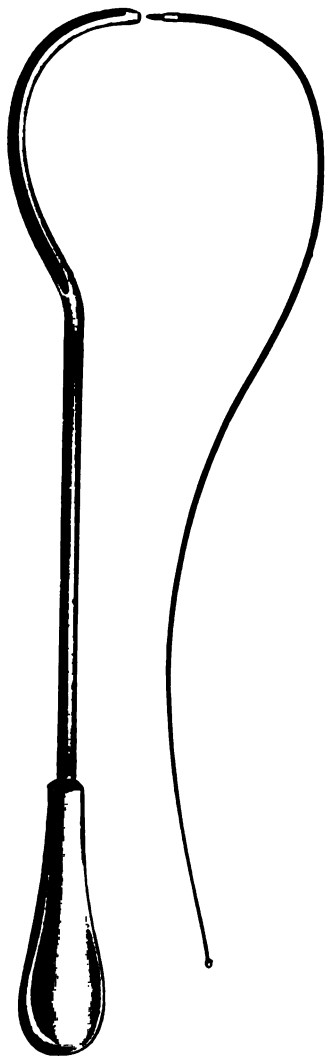


Fig. 46. Author's grooved director and detachable filiform bougie.

External Urethrotomy. External urethrotomy is indicated, first, in resilient and irritable stric- **External Urethrotomy**

tures of the bulbous and the posterior portions of the urethra; second, in multiple strictures, of small caliber, of the pendulous urethra; third, in strictures which ordinarily would be amenable to dilatation, but in which a bad complicating cystitis or pyelonephritis render such a procedure hazardous.

External urethrotomy is performed in various regions of the urethra—the pendulous, the bulbous, the posterior urethra. Only the latter operation will be considered.

The patient is placed in the lithotomy position with his pelvis on a stout cushion. The grooved director or bougie is introduced into the blad-

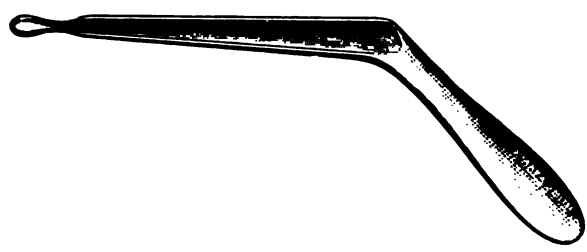


Fig. 47. Author's self-retaining gorget, actual size.

der, or to the stricture, if the latter does not allow its passage, and held by an assistant who also lifts the scrotum upward. A longitudinal incision through the median raphé, carried to within one-fourth inch of the anus. exposes the urethra. If the stricture is in the bulbous portion, it should be divided from without by cutting from behind forwards. If the stricture is in the deep urethra, an incision two cm. long should be made in the bulbous part, a gorget inserted through the perineal wound to or through the stricture, and the grooved director withdrawn. If no callus exists around the bulbous and membranous urethra, and it is desirable to leave the bulbous intact, the latter is freed by

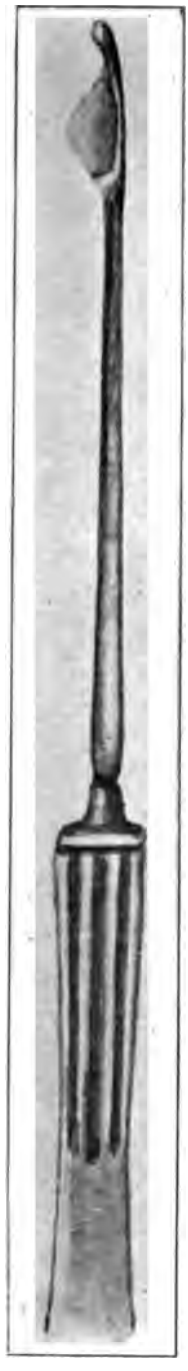


Fig. 48. Author's knife.

blunt dissection out of the surrounding tissues, then pushed upward and the membranous urethra incised. The index finger is introduced over the gorget up to the obstruction. Alongside of the volar surface of the finger the author's knife

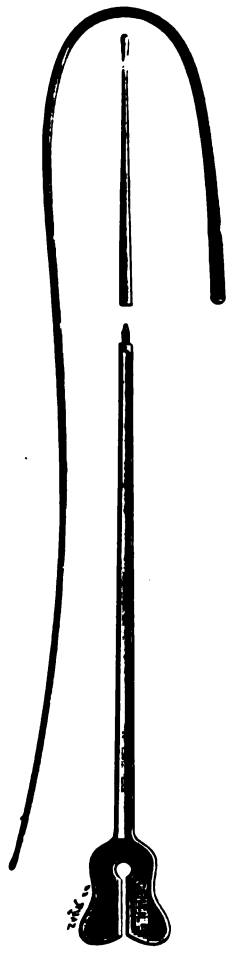


Fig. 49.

may be inserted, passed through the stricture and pulling from behind forward, under appropriate pressure, all the fibres or the callus at the floor of the urethra are divided. If the lumen

of the stricture should be too small to admit the knife, the latter cuts from before backwards on a thin, grooved director or a small probe previously passed as a guide from below through the stricture. After all fibres are divided, which is determined by the index finger of the left hand, a rubber catheter (No. 30 Fr.) is placed through the perineal opening in the bladder and fastened to the skin with a silkworm gut suture. Around this tube the urethra may be closed with a few fine catgut sutures, the perineal tissues and the skin with deep silkworm gut sutures, which effectively check all bleeding. The tube should be removed after four days; the sutures after eight days. The bladder should be irrigated twice daily with antiseptic solutions while the drainage tube is *in situ*.

Guide Loops Useful in Filiform Strictures

In those cases in which the grooved director or the bougie can only be carried to the stricture, it is advisable to secure the urethra on both sides of the incision with a silk thread as a guide loop. The fibres are then divided over a filiform or Wheelhouse bougie, with the knife keeping in close touch with the bougie.

Procedure in Impassable Strictures

If it is impossible to find the opening in the stricture, or recognize the retro-strictural part of the urethra, the bladder should be opened by suprapubic cystotomy, the vesical end of the stricture located by retrograde catheterization and the urethra opened from the perineum by cutting down on the point of the metal catheter. A small director will readily pass from there forward through the stricture and the latter may then be divided over it.

The passing of sounds should begin two weeks after the operation. The perineal wound closes at the end of the third week.

Resection of the Urethra With or Without a

Plastic Procedure. The operation may be performed in cases of multiple, dense fibrous strictures in the anterior urethra, with much callus or fistulous formation, in which other methods do not promise an improvement or have failed. The cicatricial area, exposed by a longitudinal incision, should be resected and the cut ends united by sutures. A catheter should be tied in the bladder for four days. Where the roof of the strictured portion is found intact—and this frequently will be the case—it may be left behind as from there regeneration of epithelium is greatly augmented. Some operators prefer the partial suture of the cut ends, with an opening at the bottom which is left to heal by granulation. In extensive excisions the urethra is liberated at both ends before placing the sutures.

Where over one and one-half inches of tissue has been excised plastic covering of the defect has been used with variable success. Instead of extensive resection and plastic operations in multiple strictures in the penile portion, the results of which have been quite uncertain, the implantation of the urethra in the perineum (urethrostomy) is preferable. The urethra is here exposed through a longitudinal, perineal incision, severed by a transverse cut and the central stump mobilized for the distance of an inch. It is then dragged in front of the wound, split for a distance of one-fourth inch and sutured to the skin at the posterior angle; suture of the perineal wound then follows with dressing and T-bandage.

STRICTURE OF THE FEMALE URETHRA.

The treatment is practically identical with that of the male urethra. In most cases gradual dilatation will be sufficient. It should be remembered that the normal caliber of the female urethra ranges from No. 30 to No. 45 Fr. except at the

meatus, which is between 25 and 28 Fr. Should dilatation be out of place, internal urethrotomy may be performed. A stricture at the meatus may be divided by an ordinary bistoury or the meatotome, making a lateral incision on each side.

ACUTE URETHRITIS.

The treatment of urethritis depends upon its etiology.

Non-infectious Urethritis

I. The discharges of a non-infectious urethritis, as observed under various etiological conditions, show a marked tendency to a rapid cure, if the cause is recognized and suitable treatment instituted. A urethral secretion following a traumatism, such as from the use of instruments, the presence of foreign bodies, a new-growth in the canal, masturbation or excessive coitus, will spontaneously disappear when the cause of the trouble ceases to exist. This result will also occur in discharges due to chemical irritations, such as strong injections with bichloride of mercury or silver solutions, which are frequently used as a prophylactic after cohabitation.

To allay the irritation an urethral injection with the following solution is serviceable:

℞

Extract hydrastic fl. (Lloyd),	30. grm. (℥i)
Aquæ,	150. grm. (℥v)

M.

S.: Inject 3 to 4 times a day.

Urethral secretions appearing as a part of the symptoms of general conditions such as gout, constipation, phosphaturia and oxaluria, will yield to the proper constitutional treatment of these ailments.

II. The four principal types of infectious ure-

thritis are, in the succession of their frequency, as follows: **Infectious Urethritis**

1. Gonorrheal urethritis.
2. Infectious urethritis of non-gonorrheal origin.
3. Syphilitic urethritis.
4. Urethritis tuberculosa.

1. GONORRHEAL URETHRITIS.

In a two per cent. nitrate of silver solution, or in a four per cent. protargol solution, we possess an efficient preventive. To this end a few drops of either solution may be applied with a syringe or a glass dropper in the fossa navicularis and there retained for a few minutes, shortly after a suspicious cohabitation.

The abortive treatment may be tried in every case of urethritis which is not older than two days. While, of course, the best results may be expected on the first day of the manifestation of the disease, there are sufficient proofs that the gonococcus does not always penetrate so rapidly into the tissues as to escape the influence of the germicide even after a few days; and so long as no harm can be done by this treatment, if judiciously applied, it is worth while to attempt an abortive cure within the above time limit. **Abortive Treatment**

After irrigating the anterior urethra with a hot boric acid solution a constricting rubber band should be placed around the penis at the penoscrotal junction, and one drachm of a four per cent. protargol solution injected and retained for five minutes. For irrigation with the boric acid solution a piston syringe and a sterile elastic catheter should be used. No pressure to distend the urethra should be applied and the fluid should commence flowing through the catheter before it enters the urethra, whereby the dissemination of infectious material is avoided.

During the following eight days the anterior urethra should be irrigated in the same manner with a pint of a 1:3000 hot nitrate of silver solution, once a day. The discharge, if there be any, is examined microscopically every day. If no gonococcus be present in the last five specimens, the treatment may then be discontinued; otherwise, the systematic treatment for gonorrheal urethritis should be commenced.

Avoidance of Alcoholic and Sexual Excitement

The use of alcoholic beverages should be absolutely prohibited except in patients in whom, from long continued habituation, grave nervous disturbances would likely follow its sudden withdrawal. In these cases some claret diluted with water may be allowed.

Sexual excitement and physical exertion must be rigorously avoided.

Diet

The diet should be non-stimulating. Meats in excess, highly-seasoned foods, strong tea or coffee are to be avoided in the acute stage.

Suspensory

A well-fitting suspensory bag will relieve the sensation of dragging on the spermatic cord when the patient has to be much on his feet. A piece of antiseptic gauze, not cotton, to catch the discharge should be placed around the glans penis in such a way as not to constrict the urethra. Most convenient for this purpose are the little bags called "gonorrhea bags." Patients having a roomy prepuce may use a dressing consisting of a few layers of gauze four inches square with a slit cut in the center just large enough to be pulled over the glans into the coronary sulcus. The prepuce is then drawn forward over the gauze and glans.

For women, a gauze sponge saturated with an antiseptic should be placed between the labia and renewed after each micturition. Male patients must also be advised of the necessity of renewing

the gonorrhea bags, if such be used, as soon as they become soiled, which should rarely occur if the gauze is properly, and of necessary thickness, wrapped around the penis.

Precautions to Prevent Autoinfection and Infection of Others

Every patient should be clearly apprised of the danger of communicating the disease not only to other persons but also to other parts of his own body, especially the eyes, and the rectum; and the necessary instructions should be given how to prevent this.

Undoubtedly gonorrheal urethritis in exceptional cases has disappeared without any treatment, or notwithstanding an internal medication. It must also be admitted that a gonorrheal urethritis will occasionally terminate favorably by prolonged rest in bed, together with a milk diet and urethral injections of plain hot water.

Necessity of Early Treatment

But against these sporadic facts I submit the numerous cases which run a troublesome if not disastrous course if unattended to or not properly treated from the beginning. And then again nobody would seriously think of keeping a large proportion of our male population in bed for weeks at a time on account of gonorrheal urethritis, when by suitable treatment the patient can be cured in a manner which does not necessitate detention from his daily pursuits nor the invention of a pretext for remaining in seclusion.

Points of Importance for a Successful Treatment

In order to deal successfully with acute gonorrheal urethritis the following points should be distinctly remembered:

1. The acute symptoms are due to the irritating qualities of the toxins.

2. The tissues if slightly assisted are usually capable of taking care of the gonococcus, consequently the toxins will have to be frequently removed and the gonococcus, as far as it can be reached, destroyed.

3. The treatment should be commenced as early as possible after the infection and remedies selected which, while possessing strong germicidal qualities, do not increase the inflammatory conditions already present.

Local Treatment

Injections and not irrigations under pressure should be employed and even Janet, the sponsor for the irrigation method for acute gonorrheal urethritis, has come to this point of view, as expressed by the author some years ago. The effect produced by these irrigations is just contrary to the principles so essential in the management of the acute stage of gonorrheal urethritis. The poor results, the almost inevitable complications and chronicity of such cases, is not so much surprising as the tenacity with which some physicians still adhere to this method. Potassium permanganate, even in the strength of 1 in 500, has no effect on the gonococcus. The only benefit that could possibly be obtained (the cleansing of the urethra by large quantities of warm fluid), is offset by the irritating mechanical and chemical qualities inseparable from this method. A diuretic serves the same purpose in a perfectly harmless way.

Irrigation Treatment Harmful in the Acute Stage

The syringe should have a capacity of three drachms, should have a blunt tip and may be made of glass, rubber or metal, so that it can be thoroughly cleansed and sterilized. The quantity to be injected at a time depends on the capacity of the anterior urethra; however, enough fluid should be used to slightly balloonize the canal without any perceptible discomfort to the patient. It should also be borne in mind that the capacity of the urethra varies with the degree of inflammation.

Mode of Injecting

The patient should be instructed in the proper manner of injecting. This remark might be con-

sidered unimportant, but experience in this respect has demonstrated the necessity of doing so in every case. Some patients, if not instructed, inject in such a way that most of the solution runs out alongside the syringe before it even enters the urethra; others inject properly, but lose the greater part of the solution by insufficient pressure with the fingers at the meatus. I have known patients to inject into the preputial sack, and one who squirted the medicine onto the glans penis.

Protargol

The remedy which has given the most satisfactory results for many years, and which now seems to be generally recognized as the most valuable, is protargol. If judiciously used, it promptly destroys the gonococci, where they can be reached; it rapidly allays inflammation, and surely prevents complications.

The strength of the solution, the frequency of the injection and the length of time it should be retained all depend on the stage of the disease. Generally speaking, I would say that in the acute stage with much inflammation the solution must be very dilute; it should be injected at short intervals and retained but a minute. With the acute symptoms subsiding the strength may be increased, the frequency of the injections reduced and the solution retained for a longer period.

Proportionately with the concentration and the time the protargol solution is retained a more copious reactive secretion is observed at least for a few days. This is particularly noticeable upon arising and should be explained to the patient beforehand, lest he be unnecessarily alarmed.

As a routine method of treatment for this class of cases the following procedure may be recommended:

The patient should urinate before each injection so as to mechanically remove the secretion

from the urethral wall. He should then inject a one-eighth per cent. solution of protargol and retain it for one minute, repeating the treatment every two hours during the day and twice during the night. The latter point is of the utmost importance for a speedy and safe cure, and many complications and chronic cases are due to the neglect of this principle, advanced by the author and which he has tried to impress upon the practitioner for years.

Importance of Night Injections in the Acute Stage

After three days a one-fourth per cent. solution should be injected every three hours during the day and once during the night. At the end of the first week the strength may be increased to one-half per cent., to be injected every four hours and retained for five minutes, while the night injection may be discontinued. At the beginning of the third week the same solution may be injected three times a day and retained for five minutes at a time. At the beginning of the fourth week, when the secretion will be found to contain mostly epithelial cells, no, or but a few, leucocytes, and no gonococci, an astringent and mild antiseptic may be substituted for the morning and noon injection with protargol, but the latter should still be used before retiring.

Second Week

Fourth Week

The astringents most employed and serviceable are:

Astringents

℞

Zinc sulphorcarbol.,	0.60 (gr. ix)
Resorcin,	1.80 (gr. xxviii)
Aqua destil.,	140.00 (℥v)
Fluid extract hydrastis (Lloyd),	40.00 (℥x)

M. Sig. Inject morning and noon.

℞

Zinc sulph.,	1.0 (gr. xv)
Plumb. acet.,	2.0 (gr. xxx)
Aqua destil.,	200.0 (℥vii)

M. (This is known as Ricord's formula.)

℞

Cupr. sulph.,	0.20 (gr. iii)
Alum, crud.,	1.00 (gr. xv)
Aqua destil.,	200.00 (℥vii)

M. Sig.

℞

Crurin,	1.0 (gr. xv)
Aq. destil.	
Glycerin,	āā 5.0 (gr. lxxv)
Aq. destill, q. s.,	200.0 (℥vii)

M.

The astringents should be retained for a minute at a time.

Preparation of Protargol Solution

Fresh solutions of protargol, not older than three or four days, should be used, and they should, therefore, not be made from stock solutions and must be kept in stained-glass bottles. They should be prepared slowly by spreading the powder on the surface of cold water and not by mixing, stirring, heating or by the addition of solvents. These small details seem to be overlooked quite frequently but are important.

Argyrol

Argyrol may also be used in the acute stage of gonorrhea. In order to be efficient the strength of the solutions must be ten per cent. to twenty-five per cent. In such concentrations the remedy, on account of its high price, is not within reach of patients in moderate financial circumstances.

Female Gonorrhea

The female urethra is not suitable for injections, nor is it possible to retain fluids therein for

any length of time. Therefore, instead of these the author always successfully employs urethral bougies one inch long, made of protargol and gelatin. They should be inserted in the urethra once, and, later on, twice a day and there retained for ten to fifteen minutes by a pledget of gauze or cotton lightly held against the urethral orifice. By squeezing the bougie for an eighth of an inch upward from the orifice no artificial retention at all, in the recumbent position, is necessary. After the gonococcus has disappeared from the discharge, astringent medicated bougies may be inserted on alternating days with protargol bougies for about two weeks and, finally, the astringent alone for another week. Precautionary hot vaginal douches with a quart of a 1 in 3000 protargol solution, or 1 in 10,000 silver nitrate, twice, and, later, once a day, should be used. The vestibulum, the area around the vulvo-vaginal glands, the urethra and the clitoris should also be cared for in the same manner. Most effective for this purpose and easily retained is a gauge sponge saturated with the protargol solution and placed in the vestibulum. It should be replaced by a fresh one after each micturition.

Urethral Bougies

Vaginal Douches

Occasionally, but rarely, if the gonococcus lingers in the urethra, it will be necessary to employ protargol solutions as strong as one per cent.; they may not be used more than once a day and, if found inadequate, a 1 in 2000 silver nitrate solution, injected twice a day, may be substituted with satisfactory results. Before injecting silver nitrate solutions the urethra must be cleansed with warm water in order to prevent precipitation. Where this fails, after it has been tried for a reasonable time, closer investigation will reveal some complication, the most common being stricture, infection of a paraurethral duct,

Silver Nitrate in Stubborn Cases

a periurethral or a follicular abscess, invasion of the Cowper glands, or the disease has crossed the external sphincter and invaded the posterior urethra with or without producing acute inflammatory symptoms. Constitutional diseases are likely to prolong the urethritis and favor complications and should therefore be attended to.

Complications
Rest
Diet

COMPLICATIONS.—*Acute posterior urethritis,* which is characterized by symptoms identical with those of acute cystitis, requires rest in bed for a few days, a strict milk diet, care of the bowels, in short, the same management as acute cystitis. The medication indicated for acute cystitis should be instituted and injections in the anterior urethra should be discontinued until the very acute symptoms have subsided. Gonosan, in these cases, has not the least specific effect on the gonococcus, as is claimed for it, but it renders the urine bland and helps to allay the inflammatory symptoms. Santyl, which does not cause gastritis or dermatitis, and does not irritate the kidney, is preferable. The dose is from two to four capsules, three times daily. With improvement of the acute symptoms the injections may be resumed, and local treatment of the deep urethra and the vesical neck added. Daily deep injections with a drachm of a twenty per cent. argyrol solution and later of a one-half per cent. protargol solution will answer the purpose. These are given like bladder instillations (see section on *Cystitis*), with the difference that the tip of the capillary catheter is placed in the vesical neck and the solution then deposited, drop by drop, over the whole inflamed area while the catheter is being slowly withdrawn to the external sphincter.

Balsams in Acute Posterior Urethritis

Deep Injections with Protargol or Argyrol

If not recognized or taken in hand in time, posterior urethritis involves the prostate paren-

chyma, causing prostatitis. This is most likely to occur when the posterior urethra becomes infected without causing acute symptoms, which latter would draw attention to this complication.

Subacute Type

In order to timely recognize this subacute type of posterior urethritis the two-glass test as described in the section on *Chronic Urethritis* should be frequently employed in an unduly prolonged case of acute gonorrhea.

PROSTATITIS.

This complication of acute gonorrheal urethritis requires, besides the treatment for acute posterior urethritis, applications of cold to the posterior aspect of the prostate in order to prevent suppuration. This is best accomplished through the rectophore applied for fifteen to thirty minutes, several times daily. The temperature of the water circulating through the apparatus should not be so low as to produce discomfort. Ice-bags applied to the perineum add to the comfort of the patient; some, however, experience more benefit from heat.

Rectophore

Ice Bags

Urine Retention

Retention of urine, as it occurs in some of these cases, may be relieved by catheterizing under the necessary antiseptic precautions. Only soft rubber catheters are permissible for this purpose, and the bladder irrigated with a mild antiseptic solution after the urine has been drawn.

Catheterization

Prostate Abscess

If, in spite of the antiphlogistic treatment, pus forms and a prostatic abscess can be palpated through the rectum, it should be evacuated by a perineal incision. The method of opening the abscess through the rectum has been abandoned and is only permissible where an abscess is just ready to break through the dividing tissues into the rectum. The danger of gonorrheal prostitis and the risk of causing troublesome urethro-rectal

fistula is too great to practice the last named procedure as a routine method.

Surgical Relief

The position of the patient and the first steps of the operation are the same as in perineal prostatectomy. After the rectum has been liberated

Fig. 50. Rectophore.

and dragged downward and the prostate exposed, the abscess is punctured and the opening bluntly enlarged with the arms of a dressing forceps, or an artery clamp. A drainage tube is then inserted; the abscess cavity irrigated; the wound loose-

ly packed with iodoform or vioform gauze and partly sutured. Healing takes place within three to four weeks.

Spontaneous Rupture of Abscess

If there are clinical symptoms of abscess formation without the palpable evidence of fluctuation on the rectal aspect, surgical steps may be delayed for a few days. Frequently one or more abscesses may have a tendency to rupture into the urethra. Should this happen it is followed by remission of all distressing symptoms and the appearance of much pus in the urine. If spontaneous rupture does not take place very soon, the puncture of the prostate through the rectum and aspiration for diagnostic purposes is permissible. When pus is found in this manner it should then be evacuated by a perineal incision. If not surgically relieved within proper time much of the prostatic parenchyma becomes destroyed, or the pus breaks through the capsule and burrows its way beyond control. Some cases of this kind have terminated fatally by phlebitis and phlebothrombosis. Even if not leading to such serious complications, chronic prostatitis is bound to follow delay.

EPIDIDYMITIS.

The indications for the treatment of this condition are:

1. To relieve the pain and inflammation, and
2. To promote the absorption of the inflammatory products.

Rest Heat

The first purpose is best accomplished by rest in bed, a suitable support for the testicle and the application of heat in the form of hot fomentations or a hot poultice. If taken in hand before the acute symptoms have reached a climax, the following procedure usually gives satisfaction:

Guaiacol Applications

Apply with a brush or a gauze sponge a solution of equal parts of guaiacol and glycerin all over

Fig. 51. Perineal incision for [illegible]

the scrotum of the afflicted side; this causes considerable smarting for several minutes. The whole scrotum should then be wrapped in a square of absorbent cotton, twelve by twelve inches, and one inch thick. This may be covered with a piece of oil-silk or rubber protective tissue of the same size and the whole held in place by a large suspensory bag. The bag for this purpose must be extra large to accommodate the voluminous mass to be placed therein, and should have a strong elastic abdominal band, the latter to be adjusted so as to suspend the testicle as high as possible. The guaiacol acts as an antiphlogistic and anodyne; the cotton, covered with oil-silk, as a dry poultice; and the suspensory, if properly adjusted, takes away all the dragging of the testicle on the tender, inflamed cord. The effect is a momentous one; patients whose features were distorted with pain are able to walk briskly immediately after the testicle is immobilized in the manner described. One application of the guaiacol is sufficient, but the cotton, being worn down, should be renewed at least once in twenty-four hours.

Combined Effect of Guaiacol, Heat and Suspension

Three grains of salicylic acid, with lemonade, taken twice daily, seem to assist in the acute stage. Within five to eight days the swelling of the epididymis is usually reduced by one-half, and the greater part of the inflammatory effusion in the albugineal sac will have become absorbed.

Internal Medication

Moist heat furthers the resolution of the nodules at this stage. Eight thicknesses of a piece of moist gauze, ten by ten inches, are wrapped around the whole scrotum; this is covered with oil-silk of the same size; over this is placed a layer of cotton, twelve by twelve inches and a half inch thick, and the whole is supported in the suspensory bag, to be renewed mornings and

Absorbent Treatment

evenings. Unguentum Credé, or a ten per cent. ichthyol ointment may be substituted for the moist gauze during the day, the latter being reserved for the night dressing.

Scarification and Tapping

In a few cases the very abundant effusion in the albugineal sac causes so much tension that absorption becomes impossible. In this event Vidal's multiple scarifications, or tapping of the tunica vaginalis, will be necessary to open an avenue for the escape of some of the fluid. In some instances abscess formation in the epididymis occurs, necessitating free incision of the albugineal sac and evacuation of the pus, which is usually found in the head of the epididymis. This course will give speedy relief.

Abscess

Somnoform as a general anesthetic is serviceable for this short operation, but four to five ctgr. of a one per cent. stovain solution, locally injected, is just as efficient.

The pus obtained ought to be examined, as occasionally tuberculosis causes the suppuration.

Latent Tuberculosis

Cases of rebellious epididymitis, which do not yield to the usual methods of treatment, or which are subject to frequent recurrence, should be operated in the manner devised by Bazet, viz.,—

Rebellious Epididymitis

"An incision is made in the globus minor near its attachment to the testicle. At this point there is no danger of wounding the testicle or opening the vaginalis. Seizing firmly the swollen nodule of the globus minor in the left hand an incision one inch long is made downwards into the cavity of the epididymis, the pus evacuated, and the walls of the epididymis sutured to the skin. The wound is packed with gauze impregnated with one-tenth ichthyol and glycerin, a dressing applied and the organ well supported. The wound heals in a week. The patient is able to be up in four to seven days."

If left to themselves these small abscesses lead to very stubborn fistulæ which are likely to eventually destroy the epididymis.

Balsams Harmful

During an acute attack of epididymitis no balsams of any kind should be given internally. Many a case of persistent inflammation readily disappears when this point is observed. I do not believe in the dogma of discontinuing the injections with a suitable specific drug during an attack of epididymitis, because the latter is the result either of unsuitable treatment, lack of thoroughness, or disobedience of general instructions; but never caused by proper treatment.

Injections During Epididymitis

Malarial Epididymitis

Several times I have observed epididymitis during a gonorrheal urethritis, which was characterized by a quotidian and a quartan type respectively. The swelling of the epididymis rapidly followed a chill and gradually disappeared with the return of a normal temperature. The patients had malaria fever long before the gonorrhea was contracted. I also had occasion to observe the same condition in a patient who had a gonorrheal epididymitis years before he contracted malaria. In all of them quinine acted promptly on the local trouble.

COWPERITIS.

Surgical Relief

Abscess formation is the usual termination of this complication. An abscess here should be opened by a liberal incision as early as recognizable, cleaned and packed with iodoform or vioform gauze. If the abscess has already ruptured into the urethra a catheter may be tied in the bladder for a few days to prevent urine infiltration of the tissues. In the short time preceding the manifestations of an abscess, rest in bed, hot applications and opiates are serviceable.

Chronic cowperitis seriously handicaps the cure of a gonorrheal urethritis and, if not recog-

nized and duly treated, perpetuates the disease, because from this situation infectious material is constantly poured out into the urethra. The condition can only be recognized by palpation over a Béniqué or any other metal bougie of large caliber, or still better, by digital palpation of the perineum. The index finger is introduced into the rectum and its tip, turned forward above the external sphincter, presses against the rectal wall. The thumb on the perineum gradually pushes upon the tissues adjoining the raphé, proceeding along the bulbous portion as deeply as possible until a sort of gutter is formed. By means of this bidigital palpation a nodule may be felt, from the size of a pea to that of a hazel-

Diagnosis of Chronic Cowperitis

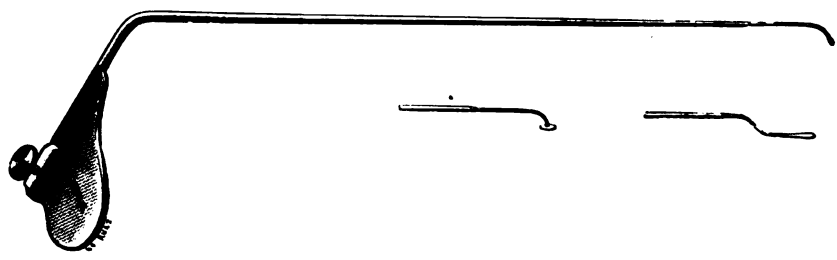


Fig. 52. Sound for electrolytic treatment of follicles and crypts.

nut, attached to the lateral wall of the urethra; this is the Cowper gland.

Massage

Massage of the gland over a metal bougie, followed by antiseptic irrigation of the urethra, is rarely beneficial. It is best to extirpate it via the perineum.

INFECTION OF THE PARA- AND PERIURETHRAL DUCTS.

This complication should be looked for in unduly prolonged gonorrheal urethritis. These ducts are found either around the meatus in the glans, especially in hypospadias, or on the mucosa close to the meatus. If they are infected pus exudes from the mouths of these blind canals

upon pressure. If injections of a ten per cent. silver nitrate solution into the ducts are not successful in checking the suppuration, it is then best to obliterate them by a thin pointed galvano-

Fig. 53. Janet's trajectotome for opening of paraurethral ducts.

cautery, or by electrolysis. If located near enough to the meatus so that they can be safely opened into the urethra, this should be done and the exposed surface cauterized.

Cautery and Electrolysis

SPERMATOCYSTITIS.

Abscess

The symptoms of the acute form resemble closely those of prostatitis and the therapy is practically the same as in the latter. If the inflammation advances to suppuration and the abscess does not soon rupture into the urethra, it must be opened. This can be done through the rectum, but more safely through a perineal incision, the technique being identical with that of opening a prostate abscess.

Surgical Relief

The treatment of *chronic vesiculitis* is the same as that of the chronic prostatitis, viz., massage, heat applied through the rectophor, hot Sitz-baths, and the gonorrheal process in the urethra properly attended to. The patient may be informed of the probability of long treatment and of the possibility of relapse. In this event, hydrotherapy, Sitz-baths, and general hygienic measures seem to be more beneficial than local manipulations.

Cystitis, pyelitis and pyelonephritis as complications of gonorrhea will be discussed in their respective sections. The treatment of extragenital complications and systemic infection does not come within the scope of this book.

BARTHOLINITIS.

Heat and Opiates

In the inflammatory stage hot poultices should be applied and opiates given to relieve the pain. If the infection leads to abscess formation a free incision should be made on the inner side of the labium and the abscess cavity thoroughly curetted. The incision should commence below the upper margin of the gland and should extend downward in order to avoid wounding the vulvovaginal bulb. The cavity should be cleansed with 1 in 500 sublamin solution and the duct opened and treated in the same manner. This is

Surgical Treatment of Abscess

facilitated by passing a fine probe which serves as a guide through the canal.

The wound may be dried and packed with iodoform gauze, or better, gauze saturated in a ten per cent. aluminum acetic solution.

The operation can be made painless by the application of a small piece of gauze saturated with a four per cent. cocain solution which is held to the surface to be incised for five minutes.

In chronic cases with hypertrophic induration of the gland the latter should be excised and the wound-bed treated in the same way as an abscess cavity.

Profuse bleeding might require a few ligatures or deep sutures which are to be tied over the gauze packing.

These chronic suppurations, if unattended, not only propagate infection through intercourse but lead to recurring infections of the urethra and female genitals and also menace the life of the woman by puerperal sepsis.

Method of A. E. Gallant

Another simple measure of treatment for bartholinitis is recommended by A. E. Gallant, applicable to those cases in which occlusion of the duct results in marked distention of the gland, causing such discomfort as to demand immediate relief, which is afforded in the following manner:

"*Excision of an Ellipse*:—Expose the inner surface of the labium minus and inject into the mucous membrane over the most prominent portion, five to ten minims of four per cent. cocaine solution, or place a pledget of cotton saturated with ten per cent. cocaine solution between the labia, until anesthesia is complete.

"With a pair of plain thumb forceps grasp and make traction on the most prominent portion of the gland (taking care not to rupture it), on the inner surface, and with scissors curved on the

flat, cut out an ellipse of tissue, including mucous membrane and gland wall, to the extent of one-third of the sac. When the gland is markedly distended, the sac well thinned, the first cut will usually bring away enough of the sac, but in some instances the sac contracts so closely that it is necessary to cut away, in circular fashion, more of the wall.

"Occasionally, where the gland has not been markedly distended, bleeding may necessitate the application of catgut ligatures at one or two points.

"Immediately following the first cut of the scissors the contents gush out and the sac contracts, the swelling diminishes to one-third, leaving an irregular circular opening, the base of which is formed by the remnant of the sac wall. This presents an important point so frequently overlooked when incision for evacuation of abscesses, viz., that with linear incisions the cut edges fall together in close apposition and readily unite, sealing the cavity; whereas elliptical or circular incisions cannot assume a position favorable to such coaptation, and therefore remain open and drain the cavity and healing must take place from the bottom. When a true abscess is present the remaining sac wall will be cast off by granulation; but where the condition is that of a retention cyst, the edges of the sac wall and mucous membrane will unite to fill in the gap made by the excised mucous membrane.

"The only dressing used is to place a pad of sterile absorbent gauze, upon which has been poured a small quantity of Van Arsdale's balsam-oil mixture (Bals. Peru, 5 per cent., Ol. ricini 95 per cent.), between the labia, to be changed and replaced by the patient each time she urinates. No packing or sutures are requir-

ed, and the patient can at once walk with freedom from suffering, and with little interference with the ordinary gait. The healing is complete within from seven to ten days.

"The other class of cases referred to is those in which infection of the gland takes place, distention occurs to such an extent as to overcome the adhesions in the outlet, the duct is forced open, and the contents escapes through the natural channel. The duct may remain patent and the patient is then annoyed by a constant purulent discharge; in some causing irritation, in others severe pruritus and dyspareunia.

"Unless these chronic forms can be treated during the stage when obstruction of the duct has resulted in distending the gland, the only means for radical cure is:

"*Excision of the Gland*: Whether we are dealing with a chronic infection of Bartholin's gland or of Skene's duct, the removal does not require any special surgical acumen. Excision of Skene's duct usually involves the floor of the urethra, and care must be taken to restore the latter in such a way as will not lead to cicatricial contraction of the meatus externus. Through an incision in the vestibule, below the urethra, the thickened duct can be dissected out and the wound closed by catgut, and primary union expected. A linear incision below the gland of Bartholin, blunt dissection and closure of the cavity, will give an ideal result." (*A. E. Gallant.*)

GONORRHEAL VULVO-VAGINITIS.

Both conditions—vulvitis and vaginitis—may be discussed together since both are usually observed together. Primary vaginitis is quite rare in the adult owing to the resisting power of the vaginal epithelium. Most frequently the infection

spreads over the vaginal mucosa from the cervical canal or from the vulva.

Rest Douches

The treatment of the very acute stage of vulvovaginitis consists in rest in bed, warm douches and care of the bowels. Most suitable are vaginal douches with mild silver solutions like protargol or argyrol. Of the protargol 1 grm. in 2,000 c. c. of water (15 grains in two quarts) should be used; of the argyrol 4 grm in 2,000 (1 dram in two quarts). The water should have a temperature of 110° F., and the douche repeated twice or three times a day. A gauze tampon moistened with a two per cent. protargol, or twenty per cent. argyrol solution is placed in the vulva and held in position by a gauze pad and a T binder. The tampin should be renewed after urination.

Protargol Argyrol

The urethra being usually involved should be looked after in the manner described in the section on *Gonorrheal Urethritis.*

As soon as the acute symptoms subside, which is recognized by a marked decrease of inflammatory swelling, irritation and discharge, the treatment is to be somewhat modified. A vaginal douche with two quarts of a warm solution of sublamin, 1 in 2,000 (15 grains) is given twice daily, mornings and before retiring, and the previously mentioned medicated gauze tampon placed in the vulva. Every other day vagina and vulva should be locally treated with a four per cent. silver nitrate or five per cent. argentamin solution through a Ferguson speculum. In order to bring the solution in contact with the whole diseased area, we insert the speculum clear up to the cervix, pour the solution into the speculum and then withdraw the latter very slowly until its distal end approaches the vestibulum. By lowering its proximal end its contents are then emptied into a suitable vessel.

Sublamin

Silver Nitrate

When after repeated examinations the gonococcus is found to be absent the silver nitrate applications may be gradually discontinued and ichthyol substituted. The latter is most conveniently employed in the form of vaginal balls which should be inserted as high up into the vagina as the finger will reach. They may be used every evening following the sublamin douche and left in the vagina where they melt completely within a short time. **Ichthyol**

The treatment of chronic vulvo-vaginitis is practically the same as of the acute form except that the silver solutions employed should be stronger. Silver nitrate may be used as strong as six per cent., and argentamin ten per cent. **Argentamin**

The yeast treatment occasionally seems to exert some influence in very stubborn cases of vaginitis. It is employed as a paste made from cerevisine and glycerate of starch. A gauze or cotton tampon dipped in this paste is placed in the vaginal vault, after a preceding cleansing douche, and left therein for from six to twelve hours. The treatment may be repeated daily or every other day. **Yeast**

Great caution should be exercised in pronouncing such patients cured, as the disease may exist in a latent stage for quite a while.

CHRONIC GONORRHEAL URETHRITIS.

The mulitude and diversity of the lesions; their extent and localization; the frequency of complications; and the involvement of the urethral appendages all tend to render the treatment of chronic urethritis rather difficult which therefore calls for a great deal of experience and carefulness from the physician.

Chronic urethritis appears in two different types:

Two Types of Chronic Urethritis

1. The glandular and periglandular form (the superficial catarrh) and,

2. As an infiltrating process, penetrating into the submucous tissues and even into the corpus cavernosum.

Frequently both types are represented in one case.

In the earlier stages the disease extends over a large surface of the mucosa, while later it becomes localized to one or more small areas.

Most commonly the posterior urethra is involved, but occasionally the process remains confined to the anterior urethra. Considering these points it is obvious that a successful management of the disease requires an exact diagnosis of the nature and extent of the lesions. In this respect the physician familiar with the use of the bulbous bougie, the urethrometer, and the urethroscope is at a decided advantage over those whose methods are but tentative; and while I am of the opinion that every practitioner should, and can, learn to successfully treat acute urethritis, I also believe that the management of the chronic type must oftentimes be left to the experienced specialist.

Two-glass Test

The "two-glass test" to locate the extent of the trouble, while still employed, is useless. It is only of value when preceded by a cleansing irrigation of the anterior urethra. In the latter case, if both portions are clear and free from shreds, the posterior urethra may be considered normal. If the first portion is cloudy or clear but carrying shreds, and the second portion normal, the posterior urethra is evidently involved.

If irrigation does not precede such a test, and the first portion passed is cloudy or contains shreds, it is impossible to say from which part of the urethra the secretion was gathered. Many

times such a finding is referred to the anterior urethra, and in this way a chronic posterior urethritis perpetuated. There are, however, cases in which the glandular apparatus of the prostatic urethra is so slightly affected that it does not show in the first portion unless the gland is massaged preceding the irrigation and the subsequent urination.

According to the two main types of chronic urethritis, the treatment is selected in the following manner:

Topical Applications

In the early stage, in which the disease extends in continuity over a larger area, irrigations or topical applications should be employed, the latter being especially useful to remove granulations and stimulate the growth of epithelium over the many minute erosions. Ultzmann's brush apparatus may be used but any urethroscopic tube of 26 to 30 Fr. caliber will serve the purpose as well. The brush, saturated with a one per cent. to two per cent. solution of nitrate of silver, is introduced through the tube, either to the internal or external sphincter, this depending on the extent of the urethritis. Both tube and brush are then withdrawn, the brush with a rotary motion.

Irrigations

The irrigations are performed with syringe and catheter, or with an irrigating apparatus.

Simpler than the irrigating apparatus, and in many respects more practicable, and serving the same purpose, is the hand syringe of a capacity of 100 to 150 cc., with a detachable shield and rubber nozzle. With this the physician has it actually "in his hand" to determine and regulate the pressure desired to balloonize the anterior urethra, or to irrigate the posterior urethra and the bladder.

C. L. Wheeler's (Lexington, Ky.) rubber shield

and tip, which may be attached to a hand syringe or connected with an irrigator, is also a very use-

Fig. 54.

ful and practical appliance for the same purpose.

When using the first method to irrigate the

anterior urethra a soft rubber catheter is attached to a hard rubber or glass syringe holding

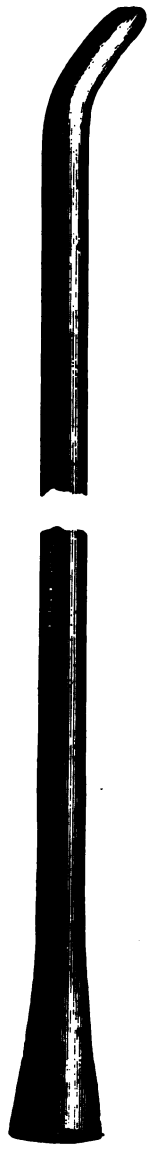


Fig. 55. Silk web catheter for deep injections.

100 to 150 cc. and carried down into the bulbous urethra to the external sphincter; and just beyond this muscle if it is desired to irrigate the

Treatment of the Deep Urethra

posterior urethra. In the latter case the fluid should be injected very slowly in order to avoid undue pressure when the liquid is forced through the narrow space between the tube and the urethral wall. Neglect of this precaution causes much tenesmus, and leads to vesiculitis and epididymitis. To the end of preventing these complications we employ a silkweb catheter which, at its vesical end, is perforated by many little openings. In this way the force of the stream is broken, and the fluid is more evenly distributed over the whole area.

While irrigating the anterior urethra the part should be slightly and repeatedly distended by compressing the meatus around the catheter for a few seconds. In this way the medicated fluid is brought into contact with every diseased spot on the unfolded mucosa.

Temperature of Irrigation Fluid

The temperature of the solutions injected should be 106 to 110 degrees F., and the urine should be voided before each treatment.

If gonococci or other micro-organisms are still present in the secretion, the following solutions may be employed:

Concentration of Solutions

Protargol, one part, in from 1000 to 300 of distilled water.

Silver nitrate, one part in from 4000 to 1000 of distilled water.

Nitric acid, one part in from 3000 to 1000 of distilled water.

Quantity to be Used

From a pint to a quart, according to the strength of the solution, should be used, and the treatment repeated every day, or every other day. In the latter case the patient may use an astringent injection on the intervening day.

Catarrhal Stage

After the secretion has lost its purulent character and appears to be free from bacteria, permanganate of potash, or some other mild anti-

septic and astringent may be used. The strength of the permanganate of potassium solution for the anterior urethra varies from 1:4000 to 1:1000; and for the posterior urethra from 1:8000 to 1:4000.

A combination of sulphate of zinc, alum and carbolic acid in one-eighth to one-fourth per cent. solutions is also beneficial. Of this preparation it is convenient to have a one per cent. stock solution which, by the addition of water, is diluted to the desired strength.

Combination of Irrigation and Instillation

If, however, infection of the deep urethra is suspected, these irrigations should be followed immediately by an instillation of three to six cc. of a one to four per cent. protargol solution, or one to four cc. of a one-eighth per cent. to one-fourth per cent. silver nitrate solution, or a twenty per cent. argyrol solution.

When using the irrigation method it should be remembered that the bladder must not be rapidly distended with large quantities of fluid —not more than 150 cc. are permissible at a time. (Compare section on *Cystitis.*)

Valentine's Technique

Technique of Irrigation (*Valentine*).

"*The Irrigator*:—This apparatus consists of a board (Fig. 56), with a brass rod attached. Readily sliding upon the brass rod is a metal block, connected by a strong bar to a collar. This firmly holds a percolator of a capacity of 1,000 c. c. (about one quart). The opening that interrupts the completeness of the collar permits easy removal of the percolator when required. The nipple of the percolator is inserted into a soft-rubber tube seven feet long. The distal end of this rubber tube is passed through a stopcock, whose essential parts are a ring for admission of the fourth finger; a sliding flange to increase or decrease the pressure of the fluid; a

shield to catch the fluid that spurts from the urethra and divert it into a basin held by the patient; a small ring to suspend the stopcock when not in use. Fig. 56 shows a urethral nozzle inserted into

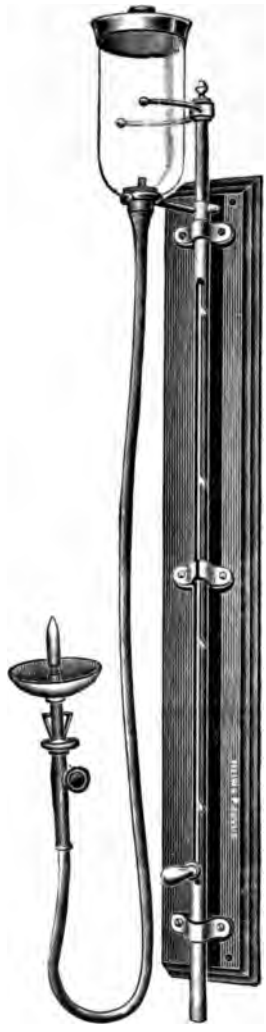


Fig. 56.

the rubber tube, projecting through the stopcock.

"The board has brass plates above and below, perforated for screws by means of which the apparatus is attached to the wall.

"The variations of pressure required for anterior and intravesical irrigations are accomplished by the action of the right thumb and index finger on the stopcock, and not by variations in the height of the percolator. The elevation of the latter should always remain the same; it is lowered only for the purpose of filling or cleaning.

"Experience has demonstrated that when the top of the irrigator board is attached to the wall at an elevation of nine feet from the floor, sufficient pressure is obtained for all purposes.

"If the stopcock is taken in the right hand, and the fourth finger passed through the large ring on the metal tube, the thumb and the index finger will easily reach and control the flange. On pushing it forward it compresses the clips, narrowing or even closing the lumen of the rubber tube; on drawing it back, the rubber tube resumes its full caliber. One or two efforts will teach the physician to allow single drops to escape from the nozzle. By gradually drawing back the flange the stream is increased until a strong jet carries over six feet. All variations in the flow, from mere drops to a strong jet, are accomplished with the percolator raised to its greatest height, viz., nine feet from the floor. The value of so controlling the flow by slight contraction of the thumb and index finger will become more evident on considering the technique of irrigations.

"The nozzles are of glass that can be easily sterilized. Their various shapes are shown in Fig. 57.

A is a pointed nozzle for irrigating a normal meatus. It is important that the irrigating fluid have as easy exit as it has entrance into the urethra. The point of this nozzle allows washing the entire urethra, and the meatus as well.

"B is a dome-shaped nozzle devised to accomplish anterior and posterior irrigations without changing the nozzle, when a meatus is congenitally very large or has been made so by meatotomy.

"C is a blunt nozzle for use when a congenitally very small (pin-point) meatus would otherwise prevent irrigation, or when the normal meatus is so swollen as to prevent the introduction of nozzle A. Its orifice then is merely pressed against the meatus and the stream so

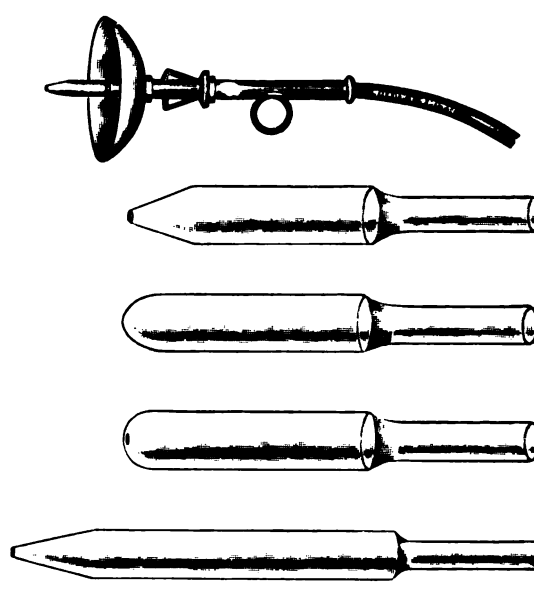


Fig. 57.

directed through it into the urethra.

"D is intended for irrigations of the female urethra and bladder. Its shape is the same as nozzle A; its length, however, is three times greater. The reason for its increased length lies in the fact that all females must be irrigated in the recumbent posture, and for the protection of thighs (from soiling with irrigating fluid), as well as for self-evident anatomical conditions, the shield must be brought down between the thighs.

If the nozzle were as short as the others the shield would prevent it coming into contact with the meatus.

"*Attachment of Nozzles.* The nozzle appropriate for the size of meatus being selected with sterilized fingers, its tubular end is easily inserted into the rubber tube projecting through the stopcock. After the tubular end of the nozzle is firmly inserted, the rubber tube should be drawn backward until the shoulder of the nozzle is arrested by the metal projection of the stopcock. This then holds the nozzle firmly, making it practically one piece with the stopcock.

"It would be criminal negligence to subject any patient to the danger of infection by using a nozzle that had been employed in a previous case. This danger is easily avoided by the following steps:

"Immediately after irrigation hold the shield, with the used nozzle still in place, under boiling hot, running water.

"Remove the nozzle and place it into a strong bichloride solution, kept ready in a glass dish for that purpose.

"When the day's office work is done, boil all the used nozzles for ten minutes in strong caustic soda solution.

"After this boiling place the nozzles in a strong (1:1000) bichloride solution, kept in a covered glass or china dish reserved for sterilized nozzles.

"Rinse each nozzle again in clean hot water before using.

"While the steps described above suffice for the sterilization of nozzles ordinarily, it is wise to take extra precautions when a syphilitic has been irrigated. In a large practice, where many nozzles are used, it is well to break the nozzle

after employing it on a case with lues. If economy prompts keeping such nozzles, each one should be boiled separately and kept in a test tube filled with mercuric bichloride, 1 to 1,000. The test tube may be closed with a rubber cork, and marked with a number or letters to designate the patient for whom the nozzle is reserved.

"*Technique of an Anterior Irrigation.*

"1. Stand on the patient's right side.

"2. Cleanse the penis, foreskin, glans, and meatus with cotton tampons soaked in corrosive sublimate, 1:3,000. If it is preferred to accomplish the cleansing with the irrigating solution, then

"3. Take the stopcock in the right hand, and for additional safety pass it under running, boiling water into which a small quantity of the irrigating fluid should be allowed to escape, then close the flange.

"4. Take the penis in the left hand, holding the left corpus cavernosum by the second, third and fourth fingers in such a manner that their tips rest lightly upon the urethra. The left thenar eminence, by being pressed inward, compresses and almost grasps the right corpus cavernosum. The bent thumb and index finger are thus left free for manipulation of the foreskin, glans, and meatus. This manner of holding the penis will at first effort appear to cramp the hand, but after two or three irrigations it will be found the most effective and easiest.

"5. Gently draw the flange of the stopcock back by contracting the right thumb and index finger. This will allow a fine stream to escape from the nozzle. Direct this stream to the outer surface of the foreskin until all its parts are thoroughly cleansed.

"6. Increase the stream slightly while direct-

ing it to the opening of the foreskin. With the left thumb and index finger slowly evert the foreskin, and, as its mucous lining is thus being exposed, wash each part as it comes into view.

"7. When the entire foreskin is retracted, wash the sulcus behind the corona, the glans, the sulci at either side of the frænum, and the lips of the meatus in the same manner. When the foreskin is so tight that it cannot be everted, drop the penis and take up the top of the foreskin with the left thumb and index finger. This will leave the opening of the foreskin slightly gaping. Insert the nozzle into the opening of the foreskin and increase the force of the stream until the preputial pouch is thoroughly ballooned. Give the tip of the nozzle every possible direction, so that the pouch may thus be as effectively cleansed as possible.

"8. After cleansing the foreskin, glans, etc., and holding the penis as indicated above, contract the thumb and index finger upon the glans so as to open the meatus.

"9. Direct the stream at first gently and then with increasing force into the opened meatus, until all visible excess of secretion is washed from it.

"10. Bring the nozzle closer and closer to the meatus until its point is within the lips.

"11. Compress the urethra with the tips of the left second, third and fourth fingers, to entirely occlude it.

"12. Augment the force of the flow until the fluid spurts from the meatus in such a manner that it is received by the shield and flows from it into the basin held by the patient. The impact of the fluid is felt against the tip of the middle finger, where it compresses the urethra.

"13. When one-fifth of the contents of the

percolator are consumed in the irrigation of the anterior third of the anterior urethra, the middle finger is relaxed and the fluid's impact is immediately felt upon the tip of the third finger that compresses the urethra.

"14. The same procedure is successively observed regarding the urethra compressed by the fourth left finger, and the impact of the fluid, with increased force, is sent to the bottom of the anterior urethra; i. e., to the anterior surface of the mucosa in front of the compressor.

"During each step of an anterior irrigation enough force must be used to fully dilate (balloon) the urethra. The nozzle should never occlude the meatus entirely, especially when strong solutions are used, lest they be forced beyond the compressor into the bladder.

"The division of the amounts of fluid used for each part of the urethra will soon become so much a matter of routine that the opertor need not observe the percolator to guide him in this respect.

"After each irrigation a layer of absorbent gauze soaked in sublamine should be placed upon the glans so as to receive any subsequent discharge, prevent as far as possible auto-reinfection, and to keep the clothing clean. If the foreskin is absent, or too small to hold the cotton, it should then be fixed in place by means of a light gauze bandage. The patient should be instructed to apply a clean piece of gauze, soaked in sublimate, after each urination.

"All the steps of an irrigation can, without any special dexterity, be so conducted that neither the patient's garments, his person, nor the office floor become soiled. Nothing need be stained, except the operator's left fingers, when using strong solutions of potassic permanganate, and then the hands can be quickly cleaned with oxalic acid or sodic bisulphide.

"When properly carried out an irrigation is as painless as it is cleanly."

Technique of Posterior or Intravesical Irrigations.—Keeping in mind what a feeble bundle of muscular fibres constitute the sphincter vesicæ, it is evident that any appreciable quantity of fluid carried into the posterior urethra under strong compression must enter the bladder. Hence irrigation of the posterior urethra distinctly implies irigation of the bladder at the same time. For convenience, therefore, irrigations of the posterior urethra are called intravesical irrigations.

The patient is prepared and sits, stands, or lies down, as may be necessary.

The Irrigation. 1. Perform thoroughly all the steps described under *Anterior Irrigation* (as above), using only half the quantity of fluid there mentioned.

2. Hold the penis firmly, while gently sinking the nozzle into the meatus until the latter is entirely occluded thereby. At the same time slowly increase the force of the flow by drawing back the flange of the stopcock.

3. As the urethra is felt distending under the left finger tips, order the patient to breathe deeply and slowly, and to make efforts at urination.

4. Ordinarily when the third step of this operation is being performed, a sensation of purling of the liquid, as it enters the bladder, will be communicated to the left fingers.

5. After one-half or three-quarters of a minute the inflow will become less accentuated and slower, as the bladder becomes filled. Then slowly push forward the flange of the stopcock, to diminish the force of the flow, until it is stopped. By close observance of this technique the bladder can be entirely filled without producing pain or even an urgent desire to urinate.

6. Rest the penis on the margin of the basin, leaving the left hand free.

7. Place the stopcock in the basin; pass the right thumb through its large ring; pass the right fingers to the outside of the basin to hold it firmly with the stopcock.

8. Extend the left hand to the shelf on which the glass urinals are kept (one of which may also conveniently rest under the patient's chair), take one and hand it to the patient.

9. Order the patient to take his penis with his left hand and to direct it toward the urinal, which he holds in his right.

10. Take the basin and stopcock from the patient's lap.

11. Order the patient to void the bladder into the urinal; some can do this sitting, others must rise for the purpose.

12. While the patient is emptying the bladder pour the contents of the basin into the sink and wash out the basin with warm water, if the patient is to be immediately irrigated again. If not, wash the basin with boiling water, and place it with the used basins, to be thoroughly cleansed after office hours.

13. Without removing the used nozzle from the stopcock, hold both under running, boiling water for a few moments. Then remove the nozzles to a dish containing sublamin, 1 in 1,000. After office hours boil the used nozzles in water and caustic soda; rinse them in clean water and place them in a dish containing sublamin 1-1,000.

All the steps of intravesical irrigation, like those of anterior irrigation, can be effectively, thoroughly, and painlessly performed without soiling any part of the patient's person or body, or the physician's office.

Impediments to Irrigation. In some cases,

when for any reason the preparations for irrigation are unusually prolonged, or when the patient is nervous, there may be a somewhat free outpouring of urine from the kidneys after the patient has emptied his bladder. A small quantity of urine in this viscus may set up such a spasm of the compressor that when an intravesical irrigation is attempted it cannot be overcome by the pressure of the irrigating fluid. Such a patient should be ordered to again empty his bladder; the irrigation will then be quite easily performed.

When potassium permanganate is used in a case in which some urine is withheld, it will be returned from the bladder either turbid or of a light straw or brownish hue. A second irrigation will then produce an unchanged return fluid.

Some patients, in making violent respiratory efforts, coupled with endeavors to urinate during irrigation, will force the compressor into a firm tonic spasm. It is well, in such instances, to ask the patient to desist from his efforts, and, while reducing the hydrostatic pressure, to divert his attention from the matter in hand. This is best accomplished by some witticism; not, however, one of which the patient is the object. The slightest tendency of the patient to laugh is instantly accompanied by a relaxation of the compressor and a consequent inflow of the irrigation fluid into the bladder." (Valentine.)

Frequency of Irrigations

The intravesical irrigations may be performed once daily, beginning with potassium permanganate solution of 1:8,000; on the second day the strength of the solution may be increased to 1:7,000; on the third day 1:6,000 may be used, and if no reaction follow a further increase to 1:4,000 may be employed on the fourth and subsequent days. Some patients' bladders will comfortably bear stronger solutions.

If in five or six days the urine does not indicate complete subsidence of the posterior urethritis, mercuric bichloride may be added to the potassium permanganate solution last employed. The addition of the bichloride should at first not be stronger than 1:50,000. On the second day this may be made 1:40,000; on the third day 1:30,000; on the fourth day 1:25,000. Only in very persistent cases can 1:20,000 be employed.

Some cases do better with the bichloride alone, and in the solutions above indicated.

Occasionally a case will be found in which neither the permanganate nor the bichloride, nor both, in combination, yield prompt effects. Then silver nitrate may be employed in solutions of 1:10,000; 1:4,000; 1:3,000; or 1:2,000, using the mildest on the first day and daily thereafter increasing the strength, but not beyond 1:2,000.

Combination of Dilatation and Irrigation

If the urethritis has caused structural changes in the mucosa, or involves the deeper tissues, or has invaded the ducts of the crypts, glands and follicles of the channel, dilatation combined with irrigation is required to promote absorption of the infiltration, restore, as far as possible, the elasticity of the urethral wall, and to remove, mechanically, the pathologic secretions.

Without a doubt it is also the thermal effect of the hot solutions which assists materially in the process of absorption and in the destruction of the bacteria in the deeper tissues.

Technique of Dilatation

The dilatations are effected in the following manner:

Previous to the introduction of any instrument every effort should be made to prevent carrying with it infection into and from one part of the urethra to another. Naturally, in the light of our present knowledge, no pretense can be made to a rendering of the urethra aseptic; yet every pre-

caution should be employed to reduce the danger of infection.

Cleansing, preliminary to urethral instrumentation, is most easily effected by irrigation of the channel. Urethral washings may be performed with large syringes, such as those known as the Guyon or Janet syringes, or with the irrigator. Dilators may be inserted into the urethra in the same manner as most other instruments. All dilators should be clothed with a rubber cover before their insertion into the urethra.

Covers

Clothing dilators with these covers is performed by grasping the mouth of the cover with the left fingers and drawing it over the dilator. This can always be done with ease if the cover be thoroughly dry. No attempt should be made to apply a cover if it retains the slightest moisture from sterilization.

Covers must be sterilized after each use. To this end they must be scrubbed in hot water with soap, each one then wrapped in a sterilized gauze napkin and boiled seven minutes in a one per cent. carbolic acid solution. (I consider plain water sufficient.) They may then be left to dry for use.

Easier still is dry sterilization by formalin fumes, after scrubbing with soap and hot water.

Lubricant

After a dilator has been clothed with its cover it should be lubricated from its point for half an inch along its shaft. Lubrichondrin is most useful for this purpose, made according to Professor Bangs' direction. It is composed of the gelatinous substance of chondrus crispus (Irish moss) to which eucalyptus oil, 1:1,000, and formaldehyde, 1:1,500, are added. Lubrichondrin is sold in collapsible tubes and in glass-stoppered, salt-mouth bottles. The former can be resterilized by boiling the closed tube in water. In using

a tube its bottom should be compressed to force out the contents, of which the necessary quantity can be placed directly upon the dilator cover. When the bottles are used about a sixth of a drachm of lubrichondrin may be poured into a sterilized Petri dish, whence it can be readily taken upon the point of the dilator.

Another good lubricant is the following preparation:

℞

Gum. tragacanth, 2.50 (40 grains)
Glycerin, 10. (2½ drachm)
Sol. acid carb. 3 per cent., 90. (3 ounces)

or the KY lubricant manufactured by Van Horn and put up in tubes.

When a dilator for the anterior urethra is to be used it is best held as if it were a pen grasped for writing.

Selection of Dilator

The selection of a dilator is necessarily predicated upon the location of the disease and the caliber of the urethra. If the anterior urethra alone requires treatment and the urethral caliber is still small, Oberlaender's anterior dilator has preference. This instrument has a slight curve near its tip, to readily accommodate it to the normal curve of the anterior urethra. The tip is rather small, permitting its insinuation through a stricture so narrow that it will let no instrument beyond 10 Fr., pass. The smallness of the tip should be well kept in mind when using this instrument; because if the greatest gentleness is not employed it may engage in a mucous fold, a wide open duct mouth, or a previously made false passage. The instrument will then not proceed, and the slightest force applied may produce serious urethral laceration.

Technique

When an obstacle of any kind impedes the easy

progress of the dilator, the instrument must be immediately withdrawn and a successive systematic series of other directions given to its point. With well-developed tactile sense, however, the surgeon will be enabled by gently touching all parts of the obstacle to form a clear mental picture of its character. When the point of the instrument has found the correct urethral lumen it will easily and smoothly glide to its destination, unless again impeded by further obstacles, which then will have to be overcome in the same manner as the first.

The curve of the Oberlaender anterior dilator, being the nearest approach to that of the anterior urethra, therefore exercises the most direct pressure upon its roof and floor without distorting the canal. This consideration of the urethral curve is unnecessary when the channel is or has become sufficiently capacious to easily admit the Kollman anterior dilator, which is described below.

Steps in Procedure

The steps necessary to inserting the Oberlaender anterior dilator are as follows:

1. The patient should lie on a firm table with his legs extended, a sterilized towel is placed upon his abdomen, covering the pubis, with another over his testicles and thighs. The penis rests upon the latter towel.
2. After the penis has been cleansed the glans is taken between the left thumb and index finger.
3. The penis is gently placed in the direction of the right thigh, on a line continuing the left Poupart's ligament.
4. The clothed Oberlaender anterior dilator is then taken as before described, like a pen, with the face of the dial resting upon the interspace between the right thumb and index finger.
5. The tip of the instrument is inserted into the meatus.

6. After overcoming the angle at which the fossa stands to the urethra, the penis is drawn over the dilator, as a glove is drawn over a finger, but far more gently. The tip of the instrument is thus guided along the floor of the urethra until the bulbous portion is reached. The surgeon then experiences a sensation of reduced resistance at the instrument's point.

7. Without increasing the pressure, but keeping the tip immobile, the surgeon carries the penis, containing the dilator, in about a three-quarter circle in the same place, around and beyond the patient's left side, until the dial of the dilator faces the linea alba at its commencement above the pubis.

8. Keeping the tip within the bulbous portion the dilator is now gently tilted from the floor to the roof of this region, and the penis with the dilator raised until it stands at right angles to the body.

9. The patient's elbow, either right or left, is rested against his side to steady his arm. He is then asked to grasp the dilator where its cover projects from the meatus, and hold it in this position.

10. If the dilatation is to be in prolonged session it will materially contribute to the patient's comfort to raise the back of the table to about forty-five degrees and elevate its foot.

Further manipulations with the Oberlaender anterior dilator do not differ essentially from those to be described in discussing other dilators.

Kollman's Dilator

Kollman's four-branched dilator for the anterior urethra is intended for use when the urethra's capacty is, or when previous dilatations have brought it to, No. 21 Fr. The technique of its employment is the simplest of all dilators. After the dilator has been clothed with its cover and

lubricated the penis is held in an erect position by the left hand. The dilator is then slowly inserted, the general rules before mentioned being observed. The dial may be placed in any direction, as the instrument when closed is perfectly round. The one of choice, however, will naturally be that in which the light strikes the dial, so that the figures thereon can be easily read.

Oberlaender's Dilator

Oberlaender's Béniqué curve dilator exercises pressure only within the posterior urethra. The technique of its insertion is as follows:

1. Follow all the steps, from 1 to 8 inclusive, laid down for the introduction of the Oberlaender anterior dilator.

2. When the tip of the instrument has been raised to the roof of the bulbous portion, guide it gently through the compressor while letting the handle sink between the patient's thighs. In this motion contact of the tip with the delicate and sensitive structures at the floor of the posterior urethra is avoided.

Undeniably brilliant results are obtained in affections of the posterior urethra from the use of this dilator, without disturbing the anterior urethra. In the premature ejaculations due to irritability of the posterior urethra from masturbator's chronic hyperemia, it often exercises a salutary effect. But it is not an instrument that can be recommended to any save those whom a large experience has made familiar with intra-urethral work. The very great Béniqué curve, alarming as it may appear to the patient, allows the instrument to lie very easily in the urethra, without making any traction whatever upon its normal bend. But this very curve and its small tip make its introduction safe only in trained hands.

Kollmann's four-branched dilator for the bulb and posterior urethra is a much safer instrument

to use. It cannot, however, be employed through an anterior urethra whose capacity is less than No. 21 Fr. Its large tip excludes the danger of injury, unless violence is applied. Its Guyon curve, about one-half of that of the Béniqué, does not exercise any appreciable traction upon the urethra, while its great weight adds to the ease of its introduction. The technique thereof is the same as that laid down for the Oberlaender posterior dilator.

Oberlaender's curved dilator for the posterior and anterior urethra may be used when both these regions require dilatation. The technique of its introduction is identical with that given for the Oberlaender Béniqué-curve dilator. The angle at which it should be depressed between the thighs governs the dilatation that is to be done within the bulbous portion or beyond. Dilatation of the anterior urethra is accomplished at the same time.

Kollman's four-branched Guyon-curve antero-posterior dilator is applicable when both urethras require treatment and permit the passage of an instrument over No. 21 Fr. The technique of its insertion does not differ from that before described for the instruments intended for these regions.

Technique of Dilatation

The technique of dilatations is the same for all dilators, viz.:

1. After the instrument has been placed in the necessary position, so that the region known to be diseased embraces the branches of the dilator, it is held motionless long enough to allow the discomfort of its presence to pass off, should such discomfort be experienced at all. This period varies from a few seconds to half a minute. During this time the penis is held steadily by the left hand and drawn out to its full length, while the

right hand keeps the dilator immovably in its position.

2. Grasp the penis with the four left fingers and palm, and extend the left thumb to the ring at the dilator's handle, thus holding both penis and the dilator immovably together.

3. With the right thumb, index and middle fingers take the large screw-head or disc at the handle of the dilator and very gently turn it to the right. Continue this until the first slight resistance to its easy progress is felt.

4. If the patient is not extraordinarily timorous it will then be well to entrust the dilator to him for a few moments. It will occupy his attention and remove any apprehension he may have of pain that may be produced. At the same time it avoids cramping the surgeon's fingers, which interfere with further delicate dilatations. The patient may be instructed to avoid cramp by holding the dilator with the other hand, when the one grows fatigued.

5. At the first séance leave the dilator at the first point of resistance for from three to five minutes, unless an especially spongy mucosa, as evidenced by bleeding, urethrospasm, hyperesthesia, or fear of pain, necessitates its removal before.

6. Close the dilator's branches by very slowly turning its screw-head to the left. In doing so, watch the dial and turn the screw-head no farther than to leave it open one-half or one number Fr. to preclude the very remote and most unusual, but possible, accident of a collapse of the rubber cover, permitting the branches, if then closed entirely, to grasp the urethral mucosa.

7. Remove the Kollmann anterior dilator by drawing the penis back with the left hand and at the same time drawing the dilator from the ure-

thra with the right. Remove any one of the other dilators by tilting the anterior margin of the instrument as if to dip it into the umbilicus; the penis will then drop between the legs, after the urethra has painlessly slid from the rubber cover.

8. After each dilatation irrigate the region that was invaded; i. e., after an anterior dilatation, irrigate the anterior urethra; after a posterior dilatation, irrigate the bladder. The solution most frequently employed for this purpose is potassium permanganate, 1:6,000. In some cases this proves quite irritating after dilatation;. then it may be reduced to one-half this strength, viz., 1:12,000, or a four per cent boric acid solution may be substituted. When the urethra harbors many other bacteria besides gonococci, or without them, silver nitrate, 1:10,000 or 1:6,000, or stronger if it can be borne, will be found effective.

Irrigation Following Dilatation

Irrigations should never be omitted after dilatations or indeed any urethral instrumentation. Without them the discharge is materially increased and often persists several weeks. Pain on and even between urinations may become quite severe and all the appearances of a new gonorrhea may set in. The cause thereof is evident. If gonococci are squeezed from the mouths of ducts, or from structural interstices, they may infect urethral regions that had returned to the normal state or that had remained free from infection.

The results of omission of irrigations after instrumentation, if they portend nothing further, would entail a delay in dilatations until the reawakened acute condition had yielded to additional treatment.

Urethral Fever

But another greater and more immediate danger attends omission of irrigations; that is, urethral fever ("catheter fever"). It will suffice to

say here that since making it an inflexible rule to irrigate after each instrumentation, not a single case of urethral fever has resulted.

Reaction

Frequently on the morning after a dilatation followed by irrigation the patient will find a slight increase of the discharge. If this continues until the second morning, the urethra should be again irrigated on that day; rarely will a third irrigation be required.

Frequency and Degree of Dilatation

The frequency of dilatations, the amount of dilatation and its duration at each séance must necessarily be governed by the condition of each case, the toleration of the patient, and the results of the preceding dilatations.

Rules and Variations

A good average working list of rules to keep within the limits of safety is:

(1) Begin with two dilatations weekly.

(2) Increase each dilatation one-half number Fr. over the preceding number reached.

(3) Prolong each séance two minutes. The longest séance, however, a patient can generally endure is forty-five minutes. (I do not extend the time beyond fifteen minutes.—Author's note.)

Variations from the above may become necessary:

1. When increase of discharge persists, as it may in very rare cases, beyond three days. It must then be controlled by irrigations.

2. When marked improvement in the general and local condition shows that the intervals between dilatations may be extended. Experience has shown that recurrences are most likely to result when the intervals between treatments are too suddenly made. Therefore the extension of the intervals should be gradual. Thus, for instance, if a patient has been treated on Mondays and Thursdays, and it be determined on a Monday to extend the intervals between his visits, a

risk would be incurred by asking him to omit the treatment for a week. Therefore the next appointment should be made for Friday. If then he is found in continued improvement, the following visit is set for Wednesday, and each interval increased by one day in this manner.

3. When it is found that the usual increase of dilatation by one-half Fr. over the preceding number, or even the preceding number itself, cannot be reached without producing even slight pain, the patient may explain the condition by an intercurrent digression into the paths of Venus or Bacchus or both. Without such an occurrence the preceding dilatation may have produced a temporary swelling of the mucosa, which readily subsides. The physician, when such an impediment presents, contents himself by dilating as much as possible without producing any discomfort.

4. When a spongy mucosa, as shown by blood oozing from the meatus, a re-awakened hyperesthesia or urethrospasm, commands the removal of the instrument before the time required for the day's dilatation, the latter must then be abbreviated.

5. When a dilatation is followed by oozing of blood from the meatus, bloody urination, or pain, the subsequent dilatations should be increased by but a quarter number at each session. If even this slow procedure is still followed by any of, or all, the disturbances mentioned, it will be well to substitute flexible bougies for the dilator until the use of the bougie no longer produces the objectionable symptoms. The bougie selected should be five numbers Fr. less than the last dilatation. Thus if the number reached by the dilator was 25, the bougie to take its place should be No. 20, or a size as much smaller as will glide through the urethra easily and painlessly.

While, as a rule, the increase of dilatation at each session of one-half number Fr. may not be interrupted, this increase should never be obtained by force. Nor should the beginner attempt to exceed this, even when no resistance whatever presents thereto. Those most experienced in dilatations prefer the slow progress, because of the greater safety it assures.

The best practice is to stop dilating at the number last reached or at the first slightest resistance, and then at from three to five minutes' intervals to dilate at no more than half numbers, or up to slight resistance, until the number desired for the day is attained.

Hemorrhage

Bleeding to quite a considerable extent sometimes follows dilatations, especially in the beginning of treatment. Such a hemorrhage is usually of very short duration; if it threatens to become excessive, the penis may be compressed by a bandage until the flow ceases. Obstinate cases may require the pressure of a sound within the urethra in addition to the bandage.

As mentioned before, one of the results of dilatations is an increase of discharge on the morning following treatment, or its recurrence if no discharge existed. Oberlaender looks upon this as an evidence of the "melting" of infiltrations. However, this may be interpreted, the discharge in a case that proceeds in the ordinary manner is less in quantity, thinner in consistence, and lighter in color at each recurrence, until it ceases entirely. The products of inflammation that are carried off in the urine become smaller and less in quantity. With these manifestations the general condition of the patient improves and local as well as reflex signs of disease fade away.

The limits of dilatation and irrigation are reached when no more evidences of disease exist

or can be evoked by the tests mentioned previously.

Contraindications

There are but few conditions in which dilatations are contra-indicated. Decrepit persons, those suffering from acute febrile conditions, those with large vesical tumors or with genito-urinary tuberculosis, or those in whom a severe posterior urethritis persists, must not be dilated. The last mentioned should be treated by irrigations, or by instillations, until the condition of the posterior urethra ceases to be an impediment to dilatations." (*Valentine.*)

If the urethritis depends on the invasion of the crypts, glands and follicles, these will have to be slit, curetted, or destroyed by electrolysis. Similar treatment is required when diverticula or false passages complicate the case.

Granulations

In a large proportion of cases of chronic urethritis, disseminated areas of granulations are the cause of a persistent discharge; in others we find an association with glandulitis and periglandulitis. These granulations when of more recent date, readily disappear upon dilatation and silver nitrate irrigation. Older granulations, especially in the bulbous and prostatic urethra, frequently resist such measures, and then topical medication through the urethroscope is indicated.

The urethroscopic tube should have a caliber between Nos. 26 and 30, French, in order to well expose the lesions. The solutions employed are silver nitrate, from five to fifteen per cent., or sulphate of copper, ten to twenty per cent. These are applied by means of a cotton swab on an applicator. A treatment once a week is sufficient.

Strong Silver Nitrate Solutions

This method is more radical and efficient than instillations, because the lesions are seen and it is not necessary to depend on the very unreliable sensation of pain, and, furthermore, much stronger solutions with much less pain can be em-

ployed, while very stubborn granulations may be curetted through the urethroscope. The insignificant bleeding is checked by compression and the exposed wound surface touched with twenty per cent. silver nitrate solution.

Curetting

A decided improvement in urethroscopic diagnosis and therapy is represented in the irrigation-endoscope devised by Hans Goldschmidt, of Berlin. He utilizes the principles of cystoscopy by dilating the urethra around the distal end of the instrument with water. Its advantage is particularly obvious in the posterior urethra, where by this method details of normal and pathological conditions are demonstrated which through other urethroscopes are usually not observed, and therefore escape proper treatment.

Irrigation Endoscope

Soft infiltrations in the anterior urethra are also favorably influenced by passive hyperemia (Bier's method). The constricting band is applied at the root of the penis for from thirty minutes to one hour. This treatment should be preceded and followed by an irrigation of the urethra with any of the antiseptic solutions enumerated previously.

Passive Hyperemia

Chronic urethritis in women should be treated in the same manner as in men. Three symptoms, in women, differentiate the condition from cystitis, viz., the urine is usually clear with the exception of a few shreds; frequent urination is only complained of in the daytime; and pressure along the anterior vaginal wall is painful.

Chronic Urethritis in Women

Instead of small injections we must rely on medicated bougies, using protargol or argyrol in the bacterial stage and astringents, like sulphate zinc, alum or ichthyol, in the catarrhal stage.

Medicated Bougies

Irrigations and dilatations may be employed, and, in stubborn cases, topical applications made through the urethroscope. Suitable for this purpose are a two per cent. silver nitrate, or a five

per cent. argentamin, solution applied all over the mucosa with a cotton swab, once in three to four days.

Cautery

Hypertrophic patches of the mucosa necessitate linear cauterization.

Fissures

Fissures in the urethra which are occasionally responsible for the persistence of a chronic urethritis must be cauterized either with twenty-five per cent. silver nitrate solutions or more effectively with a fine galvano-cautery, as I recommended in 1899.

Before leaving this chapter a few words might be in place regarding the serum treatment in gonorrheal infection.

Serum Treatment

The serum obtained from rabbits which are treated with an extract of gonococcus cultures is believed to possess a bactericidal and to a certain degree also an antitoxic action. Its inefficiency in acute gonorrheal conditions is admitted by those who have done much experimental work along this line, but the serum is considered efficacious in the treatment of some complications of gonorrhea. Among those considered as amenable are, infection of the epididymis, prostate, bladder and the Fallopian tubes, and infections of parts outside of the uro-genital tract, such as gonorrheal arthritis, iritis and pericarditis.

This subject, however, is still in the experimental stage and lacks clinical support to such a degree that nothing definite regarding its value or the mode of employing it can be stated at this moment.

INFECTIOUS URETHRITIS OF NON-GONORRHEAL ORIGIN.

Very difficult to manage is the so-called infectious urethritis of non-gonorrheal origin, or mixed infection.

Etiology

The avenues of infection, if there are any, re-

main unknown, and the question as to the possibility of transmitting it is still in dispute. All the bacteria found in this urethral secretion are known to exist in a saprophytic stage in a perfectly healthy urethra. The appearance of the discharge, both macroscopically and microscopically, is different from that of gonorrhea. It commences with or without a palpable provocation, such as sexual intercourse, traumatism, or gonorrheal infection, and does not display an inflammatory character. It usually remains confined to the anterior urethra.

Spontaneous Cure

Some cases entirely recover without any treatment, some get worse under treatment and others are not influenced one way or the other. Some are benefited by a treatment based on the action of zinc decomposing silver nitrate. There is thus a production of silver albuminate and silver chloride which are deposited on the mucous lining of the urethra. There is, further, a formation of metallic silver, also traces of zinc chloride, and, finally, of zinc nitrate, which is perhaps the most effectual factor of all in the treatment. To obtain this combined local action, ten to twenty drops of a one per cent. solution of silver nitrate are injected in the urethra. Immediately afterward a sound made of metallic zinc (No. 20 Fr. scale)is inserted. This sound should be held in the urethra for a minute or two, until the chemical reaction becomes evident by the pain experienced and by the black discoloration of the vaseline with which the instrument has been lubricated. In two minutes this black stain shows that the silver-zinc reaction has occurred, and the sound is then withdrawn and should be cleansed at once after removal. It may be rubbed with potassium iodide until it has reassumed its natural color. It loses its polish soon and occasionally has to be sent to be repolished.

Combined Zinc and Silver Nitrate Treatment

CHAPTER IV.

DISEASES OF THE PENIS.

INJURIES TO THE PENIS.

Injuries of the penis should be treated according to general surgical principles. Antiseptic cleansing; trimming off the ragged tissue shreds; ligation of the bleeding vessels; suturing or packing of the wound, and antiseptic dressings are required.

Non-penetrating injuries of the corpus spongiosum are oftentimes followed by much extravasation of blood and obstruction of the urethra. The extravasation becomes absorbed by the application of gauze saturated in ten per cent. aluminum acetate solution; for the obstruction due to the same cause catheterization will be required, until the lumen of the canal becomes wider as absorption progresses. If, as frequently happens, the urethra is lacerated in the course of an injury to the penis the treatment outlined under the head of *Injuries of the Urethra* should be instituted.

CONGENITAL SHORTENING OF THE FRENULUM.

A transverse incision may be made across the frenulum; the small artery ligated; the transverse wound changed to a longitudinal one by dragging the edges upward and downward respectively; followed by suture in this position.

PHIMOSIS.

Prophylaxis.

Prophylaxis can accomplish a great deal towards preventing certain forms of phimosis, or, at least, some of the annoying features. In in-

fants the loose epithelial adhesions quite common between the prepuce and the glans should be broken down with an ordinary probe and the prepuce retracted behind the sulcus; the preputial sac should then be cleansed and mopped dry, the prepuce pulled over the glans and a gauze compress saturated with aluminum acetate, one part

Fig. 58.

to twenty parts of water, placed over the penis.

Surgical Relief Operative treatment of phimosis varies with the cause. It may be said, however, that, unless demanded by urgent reasons, operative procedures are out of place in the presence of inflam-

Antiseptics mation or virulent venereal lesions. For these latter conditions frequent injections of mild anti-

septic solutions into the preputial sac are indicated, and the application of a dusting powder where the prepuce can be retracted. A thin layer of medicated gauze or cotton may be placed between the glans and the mucosa. The best dusting powder, and one that is non-irritating, is the so-called A. B. C. powder, consisting of,

Powder Dusting

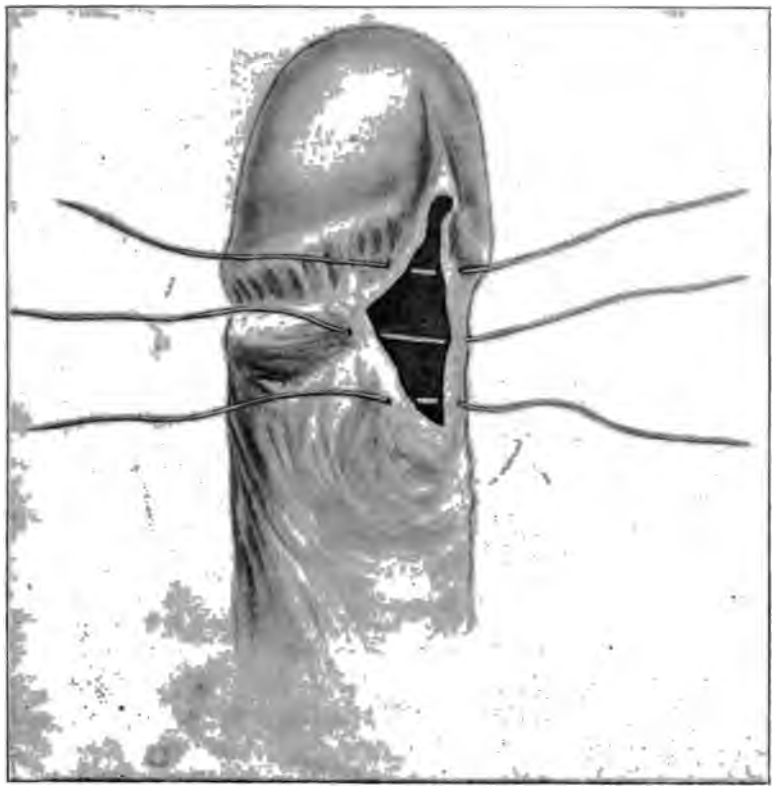


Fig. 59.

℞

Boric acid,
Bismuth subnitrate,
Calomel, āā

M. S. Dusting powder, apply two or three times daily.

Of medicated gauze the borated-iodoform or vioform gauze are serviceable.

Operation Anesthesia

The Operation for Phimosis.—The operation for phimosis can be performed under local anesthesia, except in small children where ether is preferable. As a local anesthetic, and at the same time a hemostatic, the following solution is valuable:

Cocain-Adrenalin

To 10 c. c. of a two per cent. solution of cocain add thirty drops of adrenalin (1:1,000). Of this solution half a Pravatz syringeful (ten minims) is injected subcutaneously into the cellular tissue. The fluid should be deposited drop by drop along

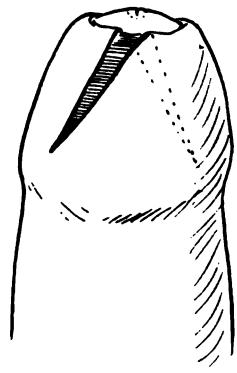


Fig. 60. First step.

the intended line of operation. The effect of the cocainization is complete in five minutes, when the operation may be commenced.

Schloffer's Method

There are two methods of operating for phimosis, one known as the Schloffer's method is indicated when both the mucosa and skin are freely movable. It is as follows:

After cleansing the parts in the usual manner an oblique incision is made in the skin from the middle of the dorsal preputial ring down to the sulcus on one side. Traction upon the skin exposes the mucosa, which is symmetrically incised, but this incision is carried on to the opposite side.

The resulting wound presents the shape of a rhomboid and is closed with interrupted sutures, the threads are left long and a coil of gauze is placed with even tension over the suture line, the long ends of the thread knotted over the coil for a second time and then cut off. The gauze fastened in this way is in close proximity to the wound edges and no other dressing is required, with the exception of a light gauze bandage to steady the gauze coil when the patient is walking. This method is well adapted for cases of a short

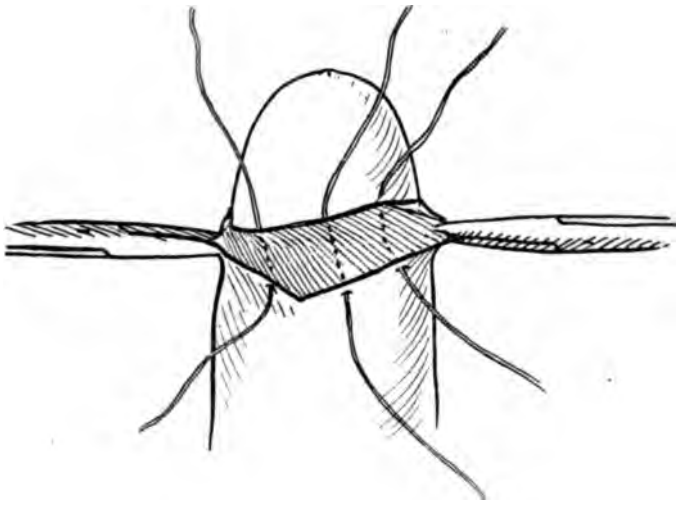


Fig. 61. Second step.

prepuce with a narrow preputial orifice.

Roser's method is suitable for a short prepuce with a tight-fitting mucosa. With a probe pointed scalpel or with the blunt arm of a pair of scissors introduced between mucosa and glans a dorsal incision is made and the skin retracted, exposing the apparently shorter cut in the mucosa. From the angle of the latter a short incision is made on either side whereby a triangular flap is produced, the base of which faces the coronary sulcus, the apex pointing to the meatus. In this way a

Roser's Method

better coaptation is obtained when the edges of the mucosa are united with those of the skin wound. The apex of the triangle in the mucosa is turned backward and sutured to the angle in the skin wound.

Circumcision

When the prepuce is too long, or hypertrophic, a regular circumcision is the operation of choice. This consists in a circular ablation of the redundant tissue, the securing of all bleeding points and suturing of the mucosa to the skin.

Bransford Lewis Method

The modification of this operation by Bransford Lewis, and the employment of his clamp and trac-

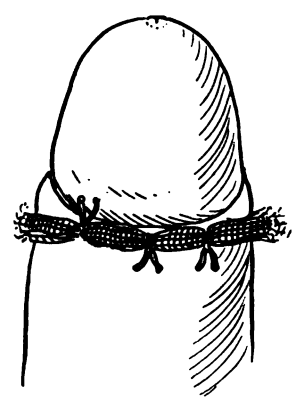


Fig. 62. Third step.

tor, permit safe and rapid work even by the less experienced surgeon, and the cosmetic effect is enhanced by the precision with which the incision can be made and the sutures placed.

Infiltration-Anesthesia

"*Technique.* Encircle the penis at its base with a rubber band. With the penis and foreskin relaxed, so that the latter extends well forward, determine and mark the site at which the removal is to be made—about one-quarter inch in front of the corona glandis. At this point, in the middle of the dorsum, insert a sharp hypodermic needle and inject *one drop* of a four or five per cent. solution of cocain; withdraw the needle and at the

same point make a slight incision with a very narrow-bladed bistoury, just large enough to permit the entrance of the blunt-pointed needle (Fig. 66), through which the remainder of the cocain solution is injected. This needle is first made to encircle the penis as far as the frenum on one side, running between the skin and mucous layers of the prepuce, the solution being deposited as the needle is withdrawn; it is re-introduced through the same incision, passing to the frenum on the opposite side, and the solution is again injected as it is withdrawn. In this manner a complete ring of cocainized tissue encircles the penis, at

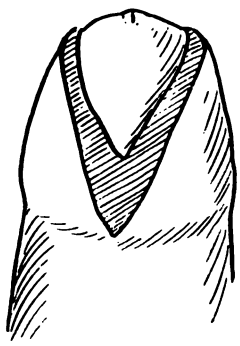


Fig. 63. First step.

the exact site for the introduction of sutures and the subsequent cutting. It is made more effectual by slight massage of the injected tissues. Complete anesthesia is accomplished in about one minute; determined by pricking the skin and questioning the patient as to remaining sensitiveness. Systemic absorption of cocain is prevented by the rubber band previously applied, and also by the clamp, which compresses the injected tissues. The next step should not be begun until complete anesthesia has been secured, permitting the patient to read a paper during the balance of the procedure. If necessary, additional injections of the solution should be made to accomplish this.

"An assistant adjusts and holds the tractor in the position shown in Fig. 67, the long arm above reaching well into the sulcus, the short arm resting against the frenum. (If the frenum is abnormally short, it should first be cocainized and

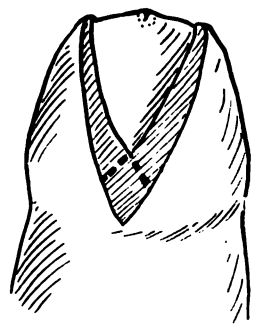


Fig. 64. Second step.

cut across, releasing the bridle effect.) The clamp is next applied as in Figs. 67 and 68, compressing the four layers of prepuce together, *in front* of the glans penis, and behind the ends of the tractor. When the clamp is being applied, and continuously thereafter, the tractor should be

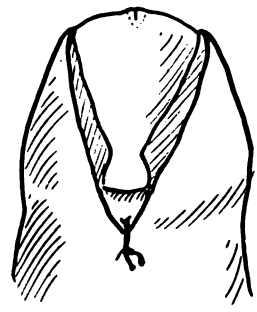


Fig. 65. Third step.

pulled well forward by the assistant; and he prevents the prepuce from slipping off the tractor by holding it with thumb above and forefinger below. The strongest traction should be made on the *mucous* layer, in order to have the stump of the

Fig. 66.

Fig. 67.

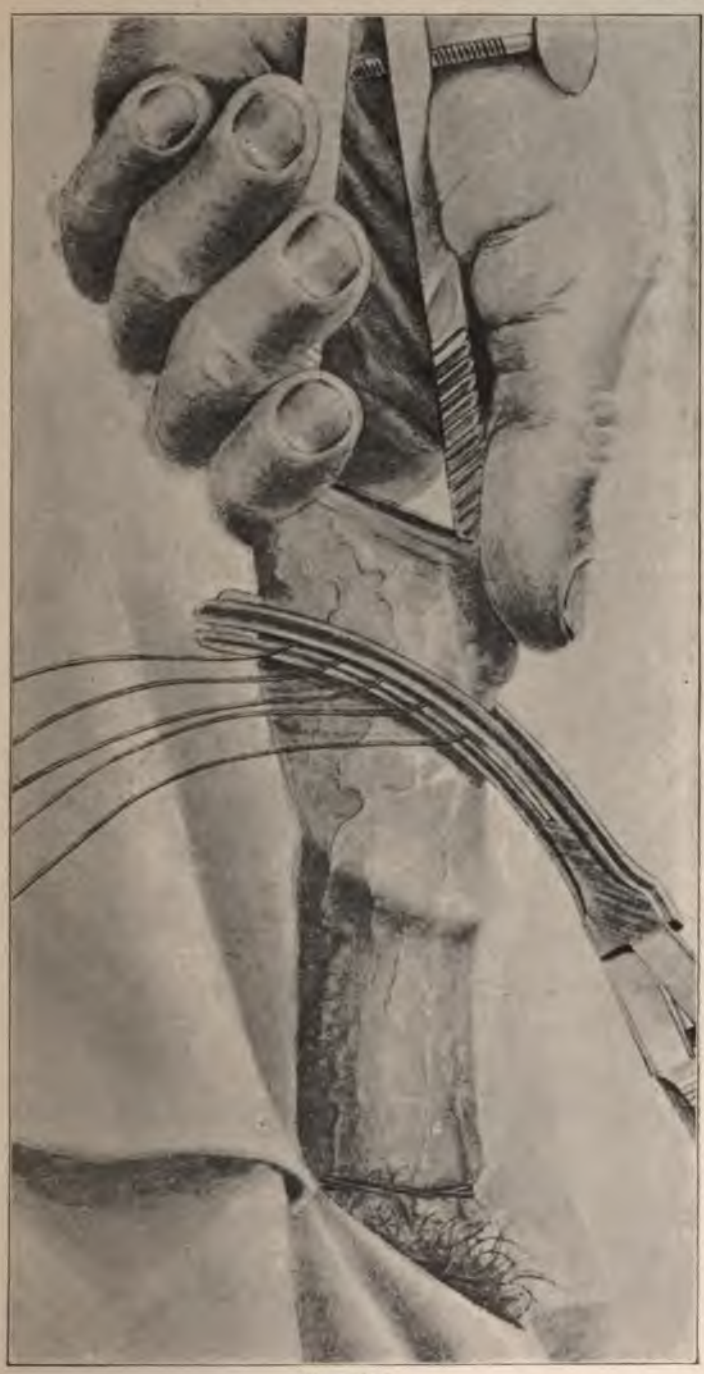


Fig. 68.

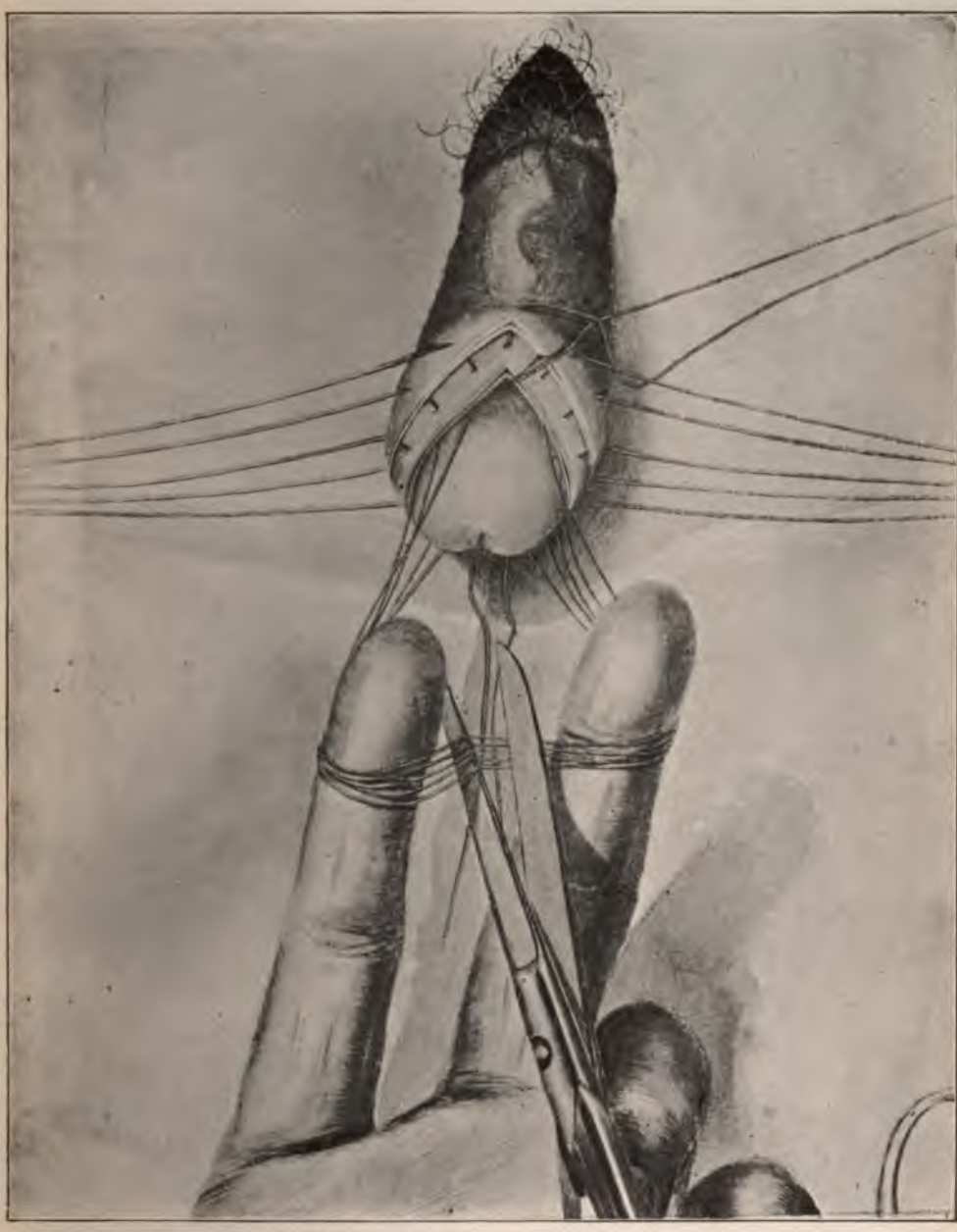


Fig. 69.

latter short enough after the operation. It is for this reason that the serrations of the tractor are directed outwards.

"Double-length sutures (16 or 18 inches each) are inserted through the fenestra of the clamp, at intervals of one-quarter inch. Usually five are sufficient. They pass through the four layers of foreskin, as follows: Skin, mucous, mucous, skin.

Fig. 70.

"When all are adjusted, that part of the prepuce anterior to the clamp is cut off with scissors, which is all the cutting required. While this cut is being made, the assistant should slightly relax his traction, as it is desirable not to cut too close to the clamp and leave too narrow a margin for the sutures.

"The tractor is removed with the redundant foreskin and laid aside; likewise the clamp, which

allows the sutures to slip through the open ends of the fenestra. The sutures are caught in a bunch with two forceps at their outer ends, and with two others at their middle (Fig. 69), between the two apposed layers of mucous membrane. Here they are drawn up and cut, leaving two sets of sutures, one set passing through skin and mucous membrane on the right side, the other set

Fig. 71.

having a similar position on the opposite side. Two additional sutures are now placed, one at the dorsum and one at the frenum, positions previously occupied by the two arms of the tractor.

"The rubber band surrounding the penis is cut, allowing the vessels to show their location by bleeding; they are caught and tied with small-

sized catgut. All sutures are then tied. They may be either catgut or silk, according to preference of the operator. If perfectly sterile, catgut is preferable as it does not have to be removed afterwards.

"The resulting stump is even and symmetrical, the mucous layer about one-quarter to one-half

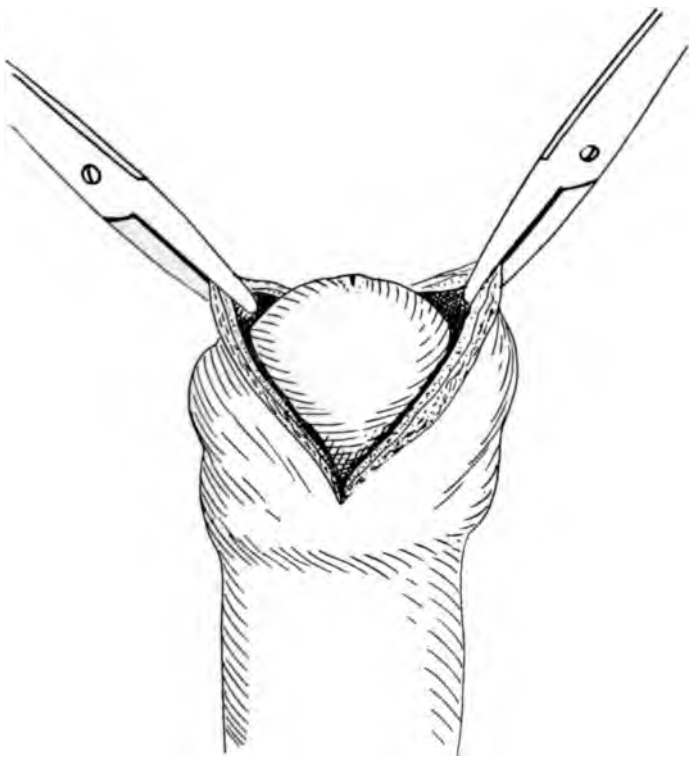


Fig. 72.

inch in breadth, and the skin sufficient to give plenty of room for erection. It hangs just over the corona glandis (Fig. 70).

"The form of dressing that I have found most convenient is adjusted as follows: After cleaning and drying the penis, it is encircled loosely with a piece of cotton enclosed in a layer of gauze (Fig.

71); this is then saturated with compound tincture of benzoin, applied with a medicine dropper. On drying, this dressing becomes moderately firm, forming an antiseptic splint. A Teufel sport bandage (large) is put on, which holds the dressing in good position. The dressing is renewed after three or five days. In eight days the parts

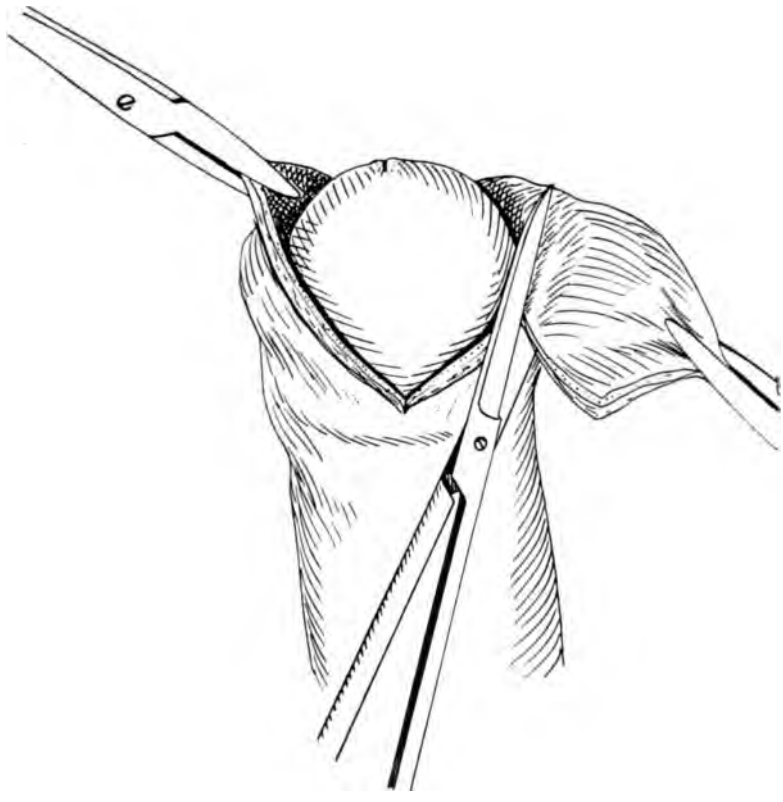


Fig. 73.

are usually securely healed and all dressings are removed except, possibly, some dry dusting-powder."—(*Bransford Lewis.*)

The author would suggest the employment of the same dressing, as recommended in the next operation.

Incision and Circumcision

A long prepuce with a tight-fitting mucosa is

best operated upon by the following method: With the aid of a grooved director the prepuce is split with knife or scissors down to the sulcus, the skin is then retracted and the incision in the mucosa extended to within one-fourth of an inch from the sulcus. The cut angles of the wound are then seized with artery clamps and tensely held by an assistant while a circular incision is made taking away as much of the prepuce as required. The constricting band is then removed and all bleeding vessels ligated. The first suture to unite mucosa and skin is now passed at the angle on the dorsum, the second one above the frenum, the following ones on both sides of the dorsal incision and finally those closing the cut edges between the angles and the frenum.

The gauze coil dressing mentioned in the Schloffer operation may be utilized but special care at each urination is required lest the depending parts near the frenum be soiled.

After any operation for phimosis the prepuce or its remnant should be replaced over the glans in order to avoid edema.

PARAPHIMOSIS.

Reduction

Reduction by taxis may be attempted, but wherever permissible the accompanying phimosis should be surgically treated at the same time. In a very recent case reduction is comparatively easily accomplished by squeezing the blood out of the glans and then pushing the latter through the constricting ring. The index and middle fingers of both hands grasp the prepuce from behind in an effort to drag it forward, while both thumbs depress the well-lubricated glans. The taxis may be considerably facilitated by placing a pledget of gauze saturated with adrenalin solution, one in five thousand, over the glans penis and the swollen mucosa for five minutes before taxis is

attempted. The congestion will then be found a great deal reduced. If the paraphimosis be irreducible in this manner, it is best to operate at once instead of inviting gangrene of the tissues by inactivity or ineffective and ill-directed conservative measures. The edematous mucosa should be incised down to the constricting ring and the

Surgical Relief

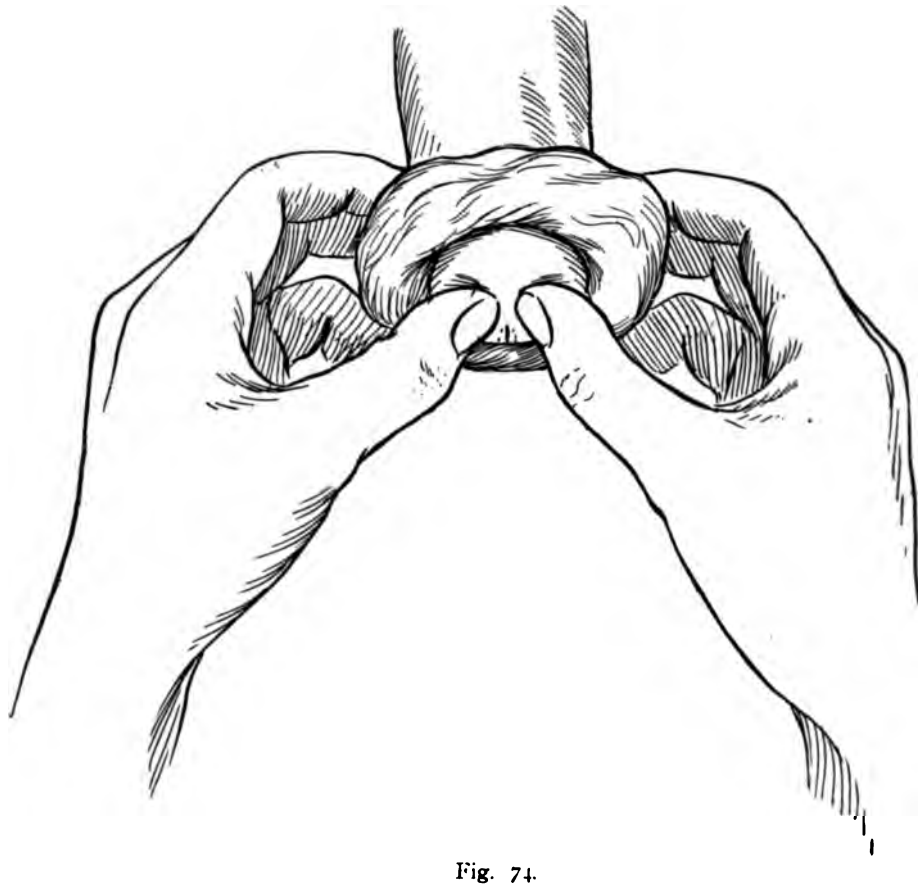


Fig. 74.

latter then split through over a small grooved director. The prepuce may then be brought forward and a regular circumcision performed unless the gangrenous condition should contraindicate the same. In the latter case the separation

Gangrene

of the slough should be assisted by compresses soaked in ten per cent. aluminum acetate solution.

CHANCROID.

Nowhere is there a greater necessity to follow the old surgical adage, "make and keep the wound clean," than in the treatment of chancroidal ulcers. The virus of the chancroid is auto-inoculable and there is no end to the number of ulcers that may result from the initial point of infection. Not only should the ulcer itself be kept clean but the surroundng parts as well.

Abortive Treatment

If the patient is seen very early in the disease the abortive treatment may be tried.

The strepto-bacillus of the soft chancre does not penetrate in the cutis deeper than two mm. and does not pass over the necrotic zone farther than one-fourth mm. . This peculiarity of the bacillus has suggested the idea of excising the infected area completely. The ulcer, after being cleansed with soap and water is anesthetized by freezing with ethylchloride and the frozen tissue taken off three mm. deep with a scalpel or razor.

Excision

The bleeding surface is dusted with glutol powder—an antiseptic and hemostatic—covered with gauze and a bandage applied. Healing takes place within a few days.

Wherever this method is not applicable, on account of the seat of the lesion or for other reasons, an attempt should be made to destroy the chancroidal virus and convert the ulcer into a simple one. For this purpose either strong nitric acid, the electro cautery or the Hollænder hot air apparatus may be used. Prior to the use of either of these methods the ulcer should be sprayed with ethyl chloride, or covered with a pledget of cotton saturated with a five per cent. cocain solution for five to ten minutes so as to lessen the pain.

Cautery

The nitric acid should be applied upon a glass

rod or on a wooden applicator tightly wrapped with cotton. In using the electro-cautery the white heat should be employed, as it is not nearly so painful, and the point of the cautery carried well under the edges of the ulcer. If the slightest area is left untouched the treatment will avail little and the entire lesion become re-infected.

Hollaender Hot Air Apparatus

The Hollænder apparatus is a combination Paquelin's cautery and air pump, wherein the air is heated to 400° F. Following this treatment the débris should be scooped from the ulcer with a sharp spoon.

Dusting Powders

Following the cauterization the ulcer should be dusted with some mild non-irritating antiseptic dusting powder, such as iodol, aristol, europhen, or the so-called A. B. C. powder made by mixing equal parts of acid boric, subnitrate of bismuth and calomel. Iodoform is also very serviceable, but is usually objected to by the patient owing to its disagreeable odor, which is impossible to disguise.

Each time preceding the use of the dusting powder the ulcer should be cleaned with peroxide and a mild solution of bichloride or sublamin. This should be practised several times a day, depending upon the severity of the ulceration. If the ulcer is subpreputial it is important to cover it with a thin film of cotton in order to keep the prepuce separated from the glans.

Wet Dressing

As a general rule it is better to treat a chancroid situated upon the integument of the penis with wet dressings as otherwise the crust which forms prevents the escape of pus and the diseased condition spreads. Any of the following solutions may be used: sublamin 1-2000; bichloride 1-5000; diluted lead water; or aluminum acetate, three per cent. The ulcer should be dressed with gauze soaked in one of the above solutions and

covered with a strip of gutta percha or oil silk to prevent evaporation. The dressing may be held in place by a bandage, a strip of adhesive plaster or the ordinary "athletic" supporter.

Ointments

Antiseptic ointments will be found useful after the ulcer has become clean. These should contain boric acid, carbolic acid, bismuth subgallate or the ammoniated chloride of mercury, 2 gm. to 30 gm. of zinc oxide ointment.

Silver Nitrate

The silver nitrate stick or pencil should not be employed in the cauterizing of a chancroid, owing to the fact that it produces a round-celled infiltration which has the characteristic indurated feeling of the primary lesion of syphilis, the error of which is apparent. It is serviceable, however, later in the disease when the virus has been destroyed and the ulcer becomes indolent and slow to heal. At this period the ulcer needs stimulation. Ordinarily a ten per cent. solution applied every second day, or a two per cent. ointment applied daily, will suffice; occasionally, however, it may be necessary to use the solid stick itself.

Iodine

For the same purpose tincture of iodine may be used instead of the silver.

Chancroid at the Frenum

Should the ulcer be situated at the frenum with a tendency to undermine the same, it should be cut through at once. In cutting the frenum a double ligature of fine silk or horsehair should be passed through it and the incision made between them, otherwise there will be profuse hemorrhage. This precaution is not necessary if the division be made with a thin cautery point or the Pacquelin burner.

SUB-PREPUTIAL CHANCROID WITH PHIMOSIS.

It will be necessary in this condition to keep the preputial sac clean by copious irrigations of sublamin or corrosive sublimate with a "duck-

billed'' syringe or irrigating nozzle and an attempt made to retract the foreskin. This, however, should always be replaced after the cleansing process, owing to the danger of paraphimosis. In those cases where much edema is present and it is impossible to retract the foreskin, an incision through the dorsum of the prepuce should be made in order to expose the chancroids.

Under no circumstances should a circumcision be performed at this time, for, as has been stated, the chancroidal virus is autoinoculable and the entire wound area will become infected.

Treatment of Phagedenic and Serpiginous Ulcers. Local treatment in these conditions must be supplemented with internal treatment for the constitutional dyscrasia. Locally, a mild, hot antiseptic dressing will aid in establishing a healthy granulating surface.

Heat

The continuous hot bath has also a beneficial effect upon these indolent ulcers and will sometimes promote healing when other methods fail. Similar good results follow irrigations with a one-fourth per cent. solution of carbolic acid, which should be kept at a temperature of 110° F. These irrigations may be extended to one hour at a time and the same, if conditions require, repeated twice or three times daily. In the intervals of course the ulcer should be covered with one of the previously mentioned antiseptic powders or lotions.

Curetting and Cauterizing

In the severe and very obstinate type curretting of the ulcer followed by cauterization of the entire surface with the Paquelin burner will be necessary. The wound is then covered with five per cent. iodoform gauze. This very painful procedure requires general anesthesia, for which somnoform is recommended. Somnoform is preferable to nitrous oxide gas because the induction

Somnoform

is very short and the duration quite long. It is, furthermore, entirely free from asphyxia and cyanosis, and no after effects are noticeable. It produces within a few seconds, anesthesia which lasts for about three minutes, a period I have found sufficient for the above mentioned operation, as well as many other smaller ones like opening of an abscess, tapping of a hydrocele, incising inguinal glands, performing internal urethrotomy or suprapubic puncture and cystotomy, the latter eventually in two stages. In experienced hands, however, this kind of anesthesia may be safely extended to fifteen minutes.

BUBO.

Swollen inguinal glands (bubo) so frequently associated with soft chancres may be treated in the following manner:

Rest and Absorbing Treatment

If no suppuration be present rest in bed and an absorbing treatment may be tried. For this purpose unguentum credé should be gently applied to the skin covering the swelling, or tr. iodine painted on with a small brush. The iodine, in order to be effective, should be employed in a twenty per cent. solution, which can only be obtained by using equal parts of alcohol and ether, as but one part of iodine is soluble in ten parts of alcohol. Three coats of this tincture should be applied.

Suppuration

Generally, however, this treatment avails little and suppuration will soon occur. So soon as fluctuation is determinable or local and general symptoms are, at least, pointing to its presence the abscess should be opened.

Various methods of procedure for the treatment of a suppurating bubo have been practised of which the following may be described:

Incision

1. The abscess is broadly incised; the pus evacuated; the cavity cleansed; a gauze drain in-

serted and the wound covered with gauze saturated in five per cent. aluminum acetate solution. Depending on the size of the cavity and the degree of periglandular infiltration healing requires from three to six weeks.

Excision

In order to shorten this process some surgeons remove part or all of the sac by curettage of the walls of the cavity. Injuries to larger vessels are possible by this procedure and for this reason blunt dissection of the gland out of its bed recommends itself in the absence of periadenitis.

Rapid Treatment

2. A very simple and useful method, which, when successful shortens the course of the disorder is the following:

After shaving and cleansing the region in the customary way and anesthetizing with ethylchlorid, an incision is made in the long axis of the bubo and carried down to the pus cavity; the latter is not only exposed, but its contents are squeezed out with the fingers by rather hard pressure all over the region. This is kept up for a minute or so until the fluid becomes free from pus and appears sanguinolent. The abscess cavity should not be irrigated, only the edge of the wound cleansed with boiling hot water. Now the wound may be closed by interrupted horsehair sutures. No drainage is necessary. The region is cleansed with hot sponges once more and a gauze collodion dressing applied. Over this comes a compressing pad and bandage to be maintained for several days. The sutures are removed after ten days, at which time, if at all, healing by primary union has occurred.

Abortive Procedures

The abortive treatment of these suppurations which formerly was freely practised has been pretty generally abandoned of late. It may be described, however: The abscess is punctured by a narrow-bladed sharp bistoury, the pus evacuat-

ed, and a one per cent. solution of benzoate of mercury injected into the cavity with a Pravaz syringe. Moist gauze is applied to the surface and fastened down by a firm gauze bandage.

Internally, any of the well known tonics may be administered in full dosage. Potassio-ferric tartrate is supposed to be particularly valuable. I have found the following combination a very serviceable one:

Tonics

℞

Ac. arsenic,	.032 (gr. ss)
Strych. sulph.,	.065 (gr. i)
Zinci phosphide,	.25 (gr. iv)
Zinc. sulph.,	2. (gr. xxx)
Ferri reducti,	6. (℥iss)

M. Cap. No. xxx.
Sig. One four times a day.

This should be supplemented with out-door life and plenty of nourishing food, particularly the fats. Should syphilis be the underlying dyscrasia, the treatment should be instituted as directed in the section on *Syphilis*.

BALANITIS AND BALANO-POSTHITIS.

Prophylaxis

Cleanliness is the best prophylactic. This is sufficient under normal conditions and also in cases of an ill-fitting prepuce. Simple balanitis may be treated by washing with warm water twice a day, drying the surface and applying a dusting powder, along with the separation of the glans from the prepuce by a thin film of absorbent cotton.

Dusting Powders

℞

Boric acid,
Bismuth subnitrate,
Calomel, equal parts,

M.
S. Dusting powder. Apply two or three times daily.

or

℞

Tannin,
Dermatol, equal parts,
M.
S. Dusting powder.

Local Applications

Erosions and ulcerations are touched with a ten per cent. silver nitrate solution, or dressed with a two per cent. to four per cent. silver nitrate salve, and absorbent gauze or cotton placed in the preputial sac.

Secondary Balanitis

The treatment of secondary balanitis depends on its etiology, complications and extent. If the prepuce can be retracted, local lesions are to be treated accordingly. Chancroids should be cleansed with a mild antiseptic solution (sublamin, 1:3000) and dusted with iodol, iodoform or dermatol powder. In hard chancres the local and constitutional treatment should be commenced at once. Condylomata acuminata, frequently caused by a recurrent balanitis, may be removed by curettage followed by a cauterizing of their bases, if they should not yield to the application of a dusting powder.

DIPHTHERITIC BALANITIS.

Diphtheritic balanitis as a complication of diphtheria, scarlet fever, typhoid fever or small pox, demands early attention in order to prevent extensive adhesions between the glans and the prepuce.

The affected area should be thoroughly cleansed and the diphtheritic exudate rubbed off with a piece of gauze saturated in an antiseptic solution. The resulting surface bleeding may be

checked by slight compression with dry gauze and tincture of iodine applied. A small piece of gauze moistened with a two per cent. solution of aluminum acetate may be placed between the glans and prepuce to keep the raw surfaces apart, being renewed every two or three hours. If the prepuce cannot be retracted, the dorsum should be split with the thermo-cautery. The glans has to be protected from being burned by inserting a grooved director into the preputial sac.

DIABETIC BALANITIS.

This is an occasional complication of diabetes caused by fermentation of the diabetic urine in the preputial sac and the simultaneous appearance of aspergillus germs. The repeated relapse of a balanitis without a palpable cause should suggest a search for the aspergillus and subsequent examination of the urine for sugar, because these germs are found at a time when other symptoms of diabetes are absent or not so marked as to attract attention.

Aspergillus

The treatment is the same as in ordinary balanitis, but, in order to effect a speedy cure, and to prevent a recurrence, the constitutional trouble must be attended to.

Constitutional Treatment

A complicating phimosis may be safely operated upon under antiseptic precautions without the apprehension of gangrene or hemorrhage.

HERPES PREPUTIALIS.

The treatment of herpes preputialis is identical with that of balanitis. For recurrent herpetic eruptions circumcision has been performed with variable success, since the cause of the trouble is not always confined to the prepuce.

ACUTE CAVERNITIS.

The symptoms and the treatment of the circumscribed type of acute cavernitis are identical

with those of a periurethral abscess. Like the latter it occurs most frequently in the corpus spongiosum urethræ. In diffuse cavernitis the corpora cavernosa penis are involved. Etiologically and pathologically it is a very serious lesion. Caused by phlebitis and thrombosis either through traumatism or phlegmon in adjoining organs, or metastatically, it leads to extensive destruction of the corpus cavernosum, to pyemia and metastases in other parts of the body. Early action is therefore urgent.

Surgical Treatment

The corpus cavernosum should be freely opened by a longitudinal incision, the cavity evacuated, scrubbed with tincture of green soap and packed with gauze saturated in a ten per cent. solution of aluminum acetate. The penis is then to be wrapped in gauze moistened with the same solution, covered with oil silk or rubber tissue, and a gauze bandage applied.

CHRONIC CAVERNITIS.

Absorbent Treatment

If it is the result of traumatism or peri-urethral gonorrheal infiltration, an absorbent treatment may be tried. Hot poultices or unguentum Credé, mercurial ointment, or a ten per cent. potassium iodide salve are usually employed, the latter two not always successfully, except when the lesion is caused by a gumma.

Gout

Nodules of the corpus cavernosum observed in gouty patients are just as obstreperous in this location as elsewhere. Very hard indurations can be removed surgically. The albuginea may be opened by a longitudinal incision, the indurated portion excised, and the cavity obliterated by buried catgut sutures. The albuginea and the skin are to be closed in two separate tiers. The operation sometimes gives very good functional results in cases in which the indurations have be-

Excision

come very dense, calcified, or even ossified, with subsequent hardening and bending of the penis.

ELEPHANTIASIS PENIS.

Elephantiasis penis is rarely seen in our climate. If restricted to the prepuce, the excision of one or more wedge-shaped pieces will considerably reduce its volume. If the penis itself is involved amputation is indicated.

TUMORS OF THE PENIS.

Benign tumors are to be surgically removed,

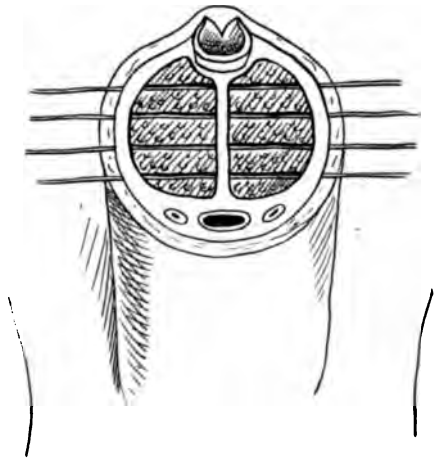


Fig. 75.

preserving as much of the penis as is possible. Malignant tumors, if not too far advanced, require amputation of the penis, and the enucleation of all the involved inguinal glands. Before operating, however, it will be well to remember that phagedenic chancres, tuberculous ulcers and liquefied gummata may resemble an ulcerated growth, and that swelling of the inguinal glands may also be associated with the latter lesions. For these reasons a very thorough general examination and finally a course of specific treatment should precede every radical operation where circumstances

Importance of Differential Diagnosis

permit and the slightest doubt as to the correctness of the diagnosis prevails.

Amputation

Amputation of the Penis.—The operation is performed on the pars pendula. A constricting, elastic band should be applied around the penis at the peno-scrotal junction. The skin and the corpora cavernosa penis may then be divided by a circular incision, at least one inch away from the growth, the dorsal arteries ligated, and the corpora cavernosa closed by penetrating sutures. To prevent retraction of the urethra, it, with its cor-

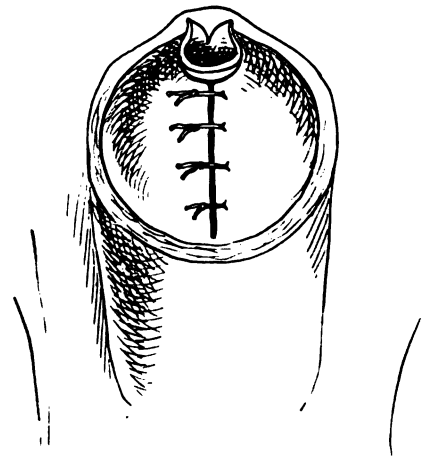


Fig. 76.

pus cavernosum, should be divided two centimeters above the first line of incision. It is then split to the extent of about one-half centimeter and sutured to the penis stump. In this manner subsequent stricture formation will be avoided.

The constricting, elastic band should then be removed and bleeding points ligated. The skin is to be united with the edge of the urethra by a few catgut sutures. A catheter may be tied in the bladder for a few days, but this is not absolutely necessary.

Total extirpation of the penis is the more radical procedure, is more likely to prevent recurrence, and it is performed in the following manner: **Total Extirpation**

The patient is placed in the extreme lithotomy position and the pendant portion of the organ wrapped in gauze saturated with an antiseptic solution. The penis should be transfixed with two, straight, short needles; under the needles a constricting rubber band is placed, and the pendant portion of the penis is then amputated by a

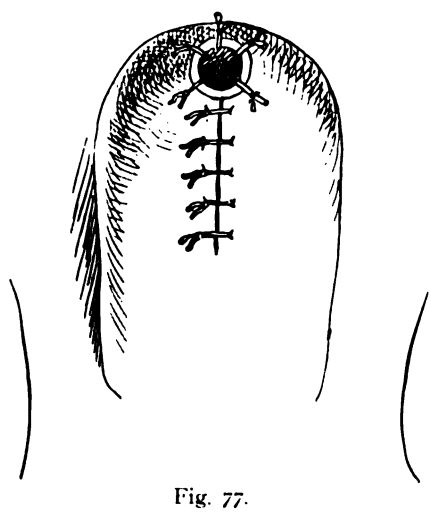


Fig. 77.

transverse incision. By this procedure all the diseased tissues in the pendant portion are removed and the spread of infection to the healthy tissues prevented.

The skin of the scrotum should be incised along the whole length of the raphé; the scrotum separated into halves quite down to the corpus spongiosum; and a full-sized metal catheter passed into the urethra as far as the triangular ligament. In passing the catheter it will be necessary to remove the rubber band, which had been placed at the root of the penis, sufficiently to permit the

entrance of the instrument. A knife is now inserted transversely between the corpora cavernosa and the corpus spongiosum; the catheter having been withdrawn, the urethra is cut across and the deep end of the urethra is then detached from the penis quite back to the triangular ligament. An incision is then made around the root of the penis continuous with that in the median line; the suspensory ligament divided and the penis separated, except at the attachment of the crura. The knife should now be laid aside and with a stout periosteal elevator each crus may be detached from the pubic arch. This step of the operation involves some length of time on account of the very firm union of the parts to be severed. Four arteries require ligature—the two arteries of the corpora cavernosa and the two dorsal arteries. The corpus spongiosum should be slit up for about half an inch and the edges of the divided urethra stitched to the back part of the incision in the perineum. The scrotal incision should then be closed with sutures, and a drainage tube inserted so far back in the deep part of the wound that it can be brought out in front and behind. No catheter is to be retained in the urethra.

CARCINOMA OF THE PENIS.

Radium

In inoperable cases of carcinoma the radium treatment should be employed. Under its application absorption of superficial infiltrations and epithelization of ulcerated portions of the new growth undoubtedly takes place, affording the patient much relief and prolonging his life. If applied in the usual manner it may be left in contact with the diseased area for from fifteen minutes to an hour.

LYMPHANGITIS.

Lymphangitis resulting from a traumatism, gonorrhea, chancroid or balanitis may be treated

with rest in bed, elevation of the penis and poultices moistened with a ten per cent. aluminum acetate solution, or unguentum Credé gently applied over the area without rubbing or pressure. Abscess formation is here very unusual; should it occur it may be treated like any other abscess.

CHAPTER V.

DISEASES OF THE SCROTUM.

SURGICAL DISEASES OF THE SCROTUM.

Injuries to the scrotum should be treated according to general surgical principles. In penetrating injuries the close proximity of the urethra and the possibility of contamination with urine should be borne in mind and the wound and dressings properly protected.

PHLEGMON OF THE SCROTUM.

Phlegmon of the scrotum is observed as a very serious complication of traumatic injuries to the urethra and, in recent years, after perineal prostatectomies. Early and multiple incisions to establish free drainage, and moist heat (ten per cent. aluminum acetate), are indicated.

Incision and Drainage

ELEPHANTIASIS OF THE SCROTUM.

Excision of parts of the sac, and suture, reduces its volume. The best results are observed in cases which are caused by venous and lymphatic congestion after a radical removal of the inguinal glands, or following a bubo or a chronic lymphangitis.

Malignant tumors of the scrotum require early removal and radical extirpation of the inguinal glands. The testicle must be sacrificed if adhesions exist between the latter and the growth. The resulting wound should be drained, loosely-packed and allowed to heal by granulation.

SCROTAL FISTULA.

Scrotal fistula, observed as the result of tuber-

culosis of the epididymis or of the inguinal glands, a suppurating bubo or a periurethral abscess, may be treated by liberal dissection of all fistulous tracts, excision of the callosities and removal of the granulation tissue by curettage. The resulting raw surface may be scrubbed with tincture of green soap, packed with vioform or iodoform gauze and left to heal by granulation.

CHAPTER VI.

DISEASES OF THE TESTICLE.

HEMATOMA OF THE TUNICA VAGINALIS COMMUNIS.

(*H. Extra-Vaginale.*)

Hematoma of the tunica vaginalis communis should be treated by rest in bed, elevation of the scrotum and a compressing bandage applied over a moist poultice surrounding the sac. If the bleeding, which is usually of a venous character, continues, the pelvis should be elevated and a compressing bandage applied, which should include the pelvis and the upper part of the thigh.

HEMATOMA OF THE TUNICA VAGINALIS PROPRIA.

(*H. Intra-Vaginale.*)

The treatment here is the same as that given above. If the effusion of blood is quite profuse the sac should be opened, with all antiseptic precautions, the clots evacuated and all bleeding points secured. The same treatment should be followed when the absorption of the effusion is retarded. The parietal layer of the tunica vaginalis propria is resected and the cavity closed by suture. This procedure is preferable to procrastination whereby the integrity of the testicle becomes endangered.

Opening of Sac

Resection of Tunica

ACUTE HYDROCELE OF THE TESTIS.

(*Periorchitis acuta.*)

If the effusion is not of an infectious character, rest in bed for a few days, with elevation of the scrotum and moist poultices, usually suffices. Should there be much and persistent painful ten-

Non-infectious Type

Infectious Type

sion, or the fluid have an infectious character, excision with drainage and partial suture gives immediate relief. Especially urgent is the incision of purulent effusions, to be followed by excision of the parietal layer of the tunica and packing with vioform or iodoform gauze.

Incision

ACUTE HYDROCELE OF THE SPERMATIC CORD.

Acute hydrocele of the spermatic cord should be treated according to the same principles as hydrocele of the testis.

CHRONIC HYDROCELE OF THE TESTIS.

Palliative Treatment

Palliative treatment is only indicated in unilocular hydrocele with a very thin sac. It consists in aspiration of the fluid or emptying of the cavity by a trocar puncture. The method gives but temporary relief, as the underlying cause sooner or later leads to re-accumulation of the fluid.

Radical Procedure

The radical cure of chronic hydrocele may be accomplished by two methods.

1. Tapping and injection of irritating fluids, causing an adhesive inflammation.

2. Free incision and excision of the hydrocele sac.

Tapping and Injection of Medicated Fluids

Tapping and injection:—The patient should be placed in the recumbent position. The skin of the scrotum should then be shaved and cleaned in the usual manner. As a local anesthetic ethyl chloride may be used, or preferably a few drops of a two per cent. cocain solution injected hypodermatically into the dependent part of the scrotum. I employ somnoform as a general anæsthetic for the operation. The left hand of the operator then grasps the scrotum on the afflicted side, from behind, in such a manner that the skin is drawn tightly over the front of the swelling. A sterilized trocar of medium size is then plunged into the cavity through the anesthetized area at

Somnoform Anesthesia

the lower pole of the swelling. To avoid injuring the testicle the index finger of the right hand is placed to within one-half inch of the trocar point perpendicularly to the long axis of the scrotum. Immediately an assistant pushes the needle of a Pravaz syringe, filled with 1 cc. (fif-

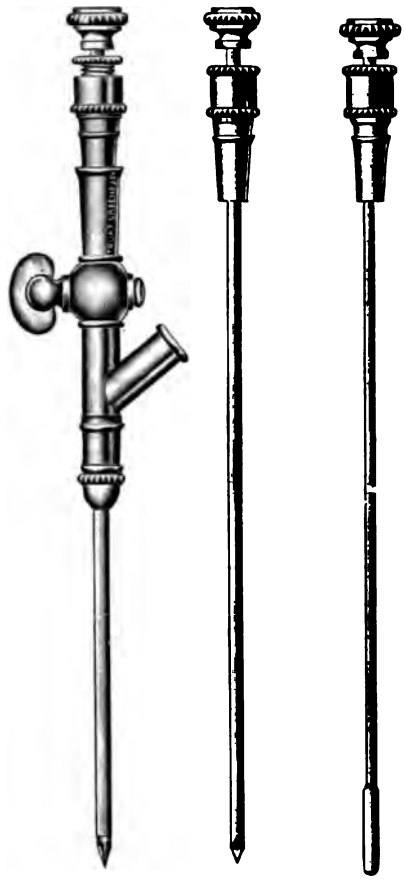


Fig. 78.

teen minims) of a pure carbolic acid solution (95 per cent.), in the same manner into the cavity from its upper aspect. The operator then withdraws the stylet and the fluid is allowed to run into a vessel placed between the legs of the pa-

Carbolic Acid

hol; after escape of latter the canula is withdrawn and the punctures are sealed. Confinement to the house is unnecessary. The fluid which refills the sac in the next few days will be absorb-

Fig. 80. Belfield's apparatus.

ed, but is better removed by a simple puncture (*Belfield*).

Attention may be called here to the complication of hernia and hydrocele, and the necessity

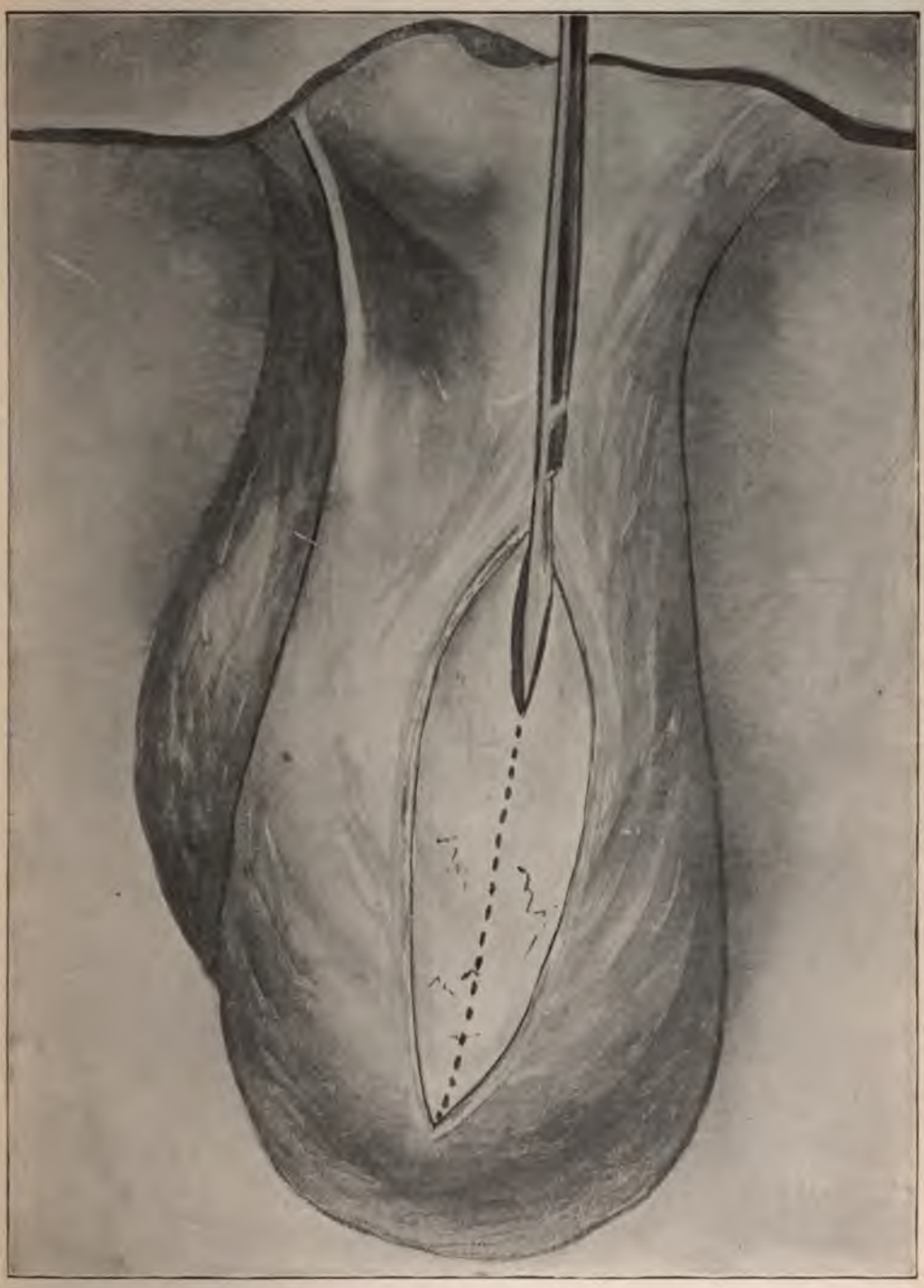


Fig. 81.

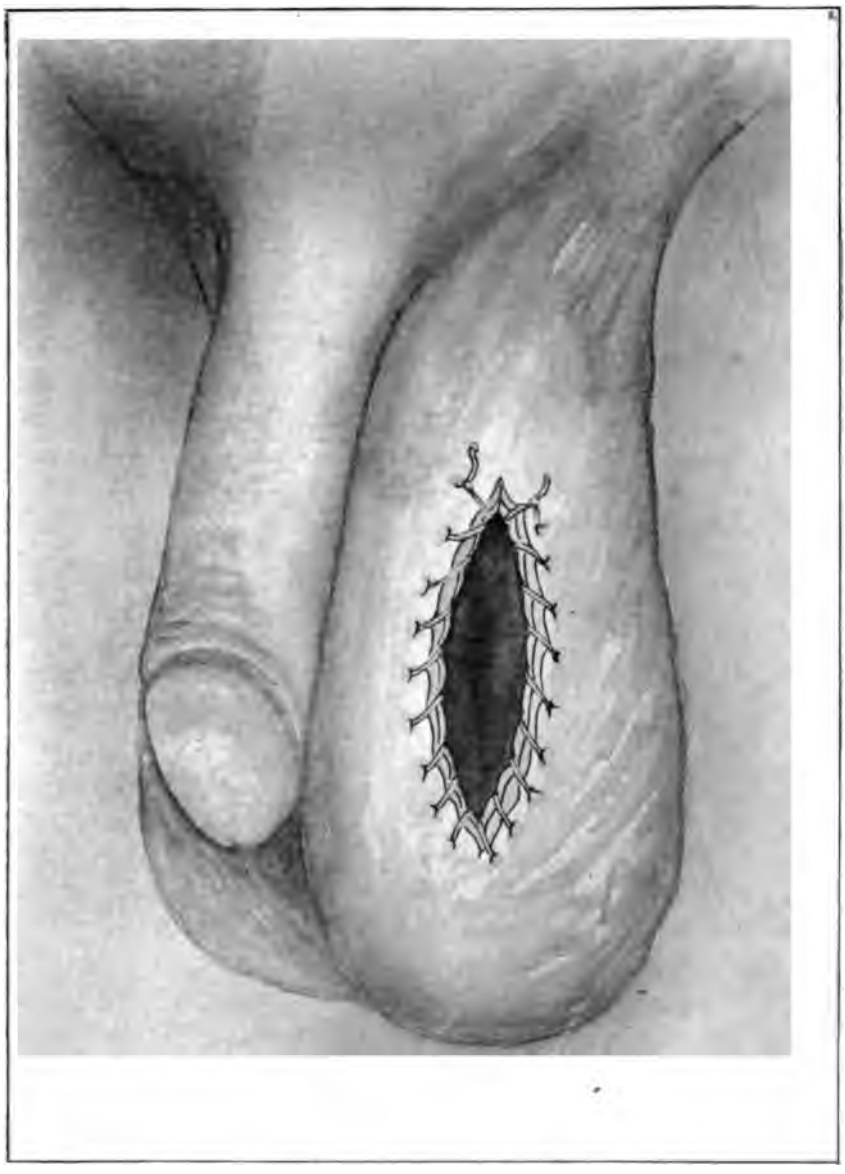


Fig. 82.

of recognizing both conditions before deciding on tapping and injections with a caustic solution. It may also be mentioned that so-called hydrocele hernialis is not a true hydrocele but a hernial sac containing serous fluid.

Hydrocele Hernialis

If hydrocele recurs after tapping and injecting, as it often does, the treatment may be repeated several times with ultimate success, but usually a radical operation will be indicated. The steps of the operation are as follows:

Operations in Multilocular and Recurrent Hydrocele

1. Shaving and thorough cleansing of the scrotum and adjacent parts.

2. Exposure of the tunica vaginalis by a long skin incision running on the lateral border of the scrotum almost to the raphé.

3. Separating of the skin from the tunica for a distance of an inch or more.

4. Incision of the tunica vaginalis from one angle of the skin wound to the other.

5. In the absence of indications for further work on the testicle or the tunica the cavity is cleansed with a two per cent. carbolic acid solution, mopped dry and iodoform powder rubbed with a gauze sponge all over the exposed surface.

6. The cut edges of the tunica and the skin are united by a running catgut suture, care being taken to close the opening sufficiently to prevent prolapse of the testicle.

7. A small strip of iodoform gauze is placed in the lowest part of the cavity, the wound covered with the same material and a dressing of sterile gauze, oilsilk and bandage applied over the scrotum. Large sacs with much thickened walls should be completely resected and all bleeding points secured. In small hydrocele sacs with thin walls partial excision is sufficient. The remaining part is seared with thermo-cautery and included in a continuous skin suture. Both pro-

Excision of Sac

Thermo-cautery

cedures contribute to reduce its size considerably. To prevent hematoma it is better not to close the wound completely, but to leave the last and lowest suture untied, placing a very small drainage tube or a few strands of silkworm gut through the opening into the cavity and applying a compressing bandage. After two days the tube or the silkworm gut may be removed, the loose suture tied and fresh dressings applied, which are to be taken off in a week. It is hardly necessary to say that the strictest antiseptic precautions should be observed lest sepsis be the result of carelessness in this respect.

Drainage

HEMATOCELE VAGINALIS.

Traumatic hematocele may be treated like hematoma vaginale. In symptomatic hematocele we usually find such advanced lesions or such thickening of the tunica vaginalis that an extirpation of the sac is indicated and very often the testicle will also have to be removed, because it is usually involved to such an extent as to be rendered functionally useless. After securing all bleeding points and thoroughly cleansing the cavity with tincture of green soap the part is packed with vioform gauze and left open.

Condition of Testicle

Technique of Castration: The pubes must be shaved, the hair removed from the scrotum and the operating field antiseptically cleansed, care being taken not to use a too strong solution which would cause dermatitis in this region. The skin is then steadied over the testicle by drawing upon it with the fingers of the left hand. The incision should be made one inch below the external inguinal ring and extend downwards sufficiently to make an opening large enough to allow the passage of the testicle. After dividing the skin and subcutaneous tissues and securing all bleeding points the tunica is opened and the testicle

Castration

and cord freed by blunt dissection. The cord is then drawn down, ligated with strong catgut in two portions and divided one-half inch below the ligatures. The vessels of the cord may be sepa-

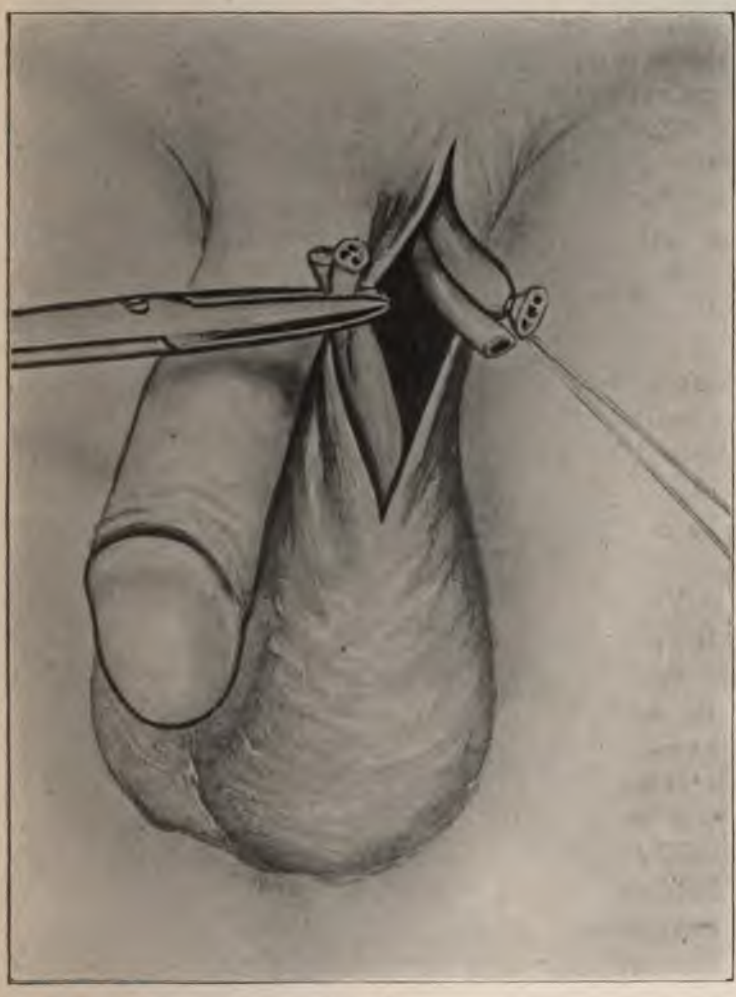


Fig. 83.

rately ligated for additional safety. After the removal of the testicle, and securing all bleeding points the cavity should be cleansed with hot salt solution, mopped dry with sterile gauze and closed with silkwormgut sutures except at the

lower angle of the wound through which a small drainage tube is placed in the cavity for twenty-four hours to prevent the formation of an hematoma. A dressing should be applied in the usual manner.

Securing of Stumps

Some operators prefer to secure the stump by suturing it to the pillars of the external inguinal ring.

The technique of castration varies somewhat if the operation is performed for tuberculosis, malignancy, or involvement of the skin of the scrotum.

Technique in Tuberculosis and Malignancy

In the latter case the incision has an eliptical form whereby the diseased part of the skin may be included. If castration is done for malignancy or tuberculosis the whole inguinal canal should be exposed by the incision and the spermatic cord, together with the surrounding glands, isolated and extirpated as far as they can be made accessible.

VARICOCELE.

Varicocele of small or even of large size, giving the patient little local trouble, is best relieved by

Suspensory Bag

a suitable suspensory bag. Free evacuation of the bowels should be provided for in order to avoid pressure upon the spermatic vein by fæces

Sitz Bath

accumulating in the sigmoid. A cool Sitz-bath will be of assistance; also the application of a

Faradic Current

mild faradic current along the cremaster muscle. It is not so much the size of the varicocele, nor the exaggerated danger of atrophy of the testicle,

Neurosis

that calls for operation, but the neurosis which oftentimes develops in these cases.

The simplest, most efficient and safest operation consists in the resection of the major part of the veins of the pampiniform plexus.

Resection

Technique

After shaving and cleansing the operating field an incision of from half to three-quarters of an inch is made over the cord on a level with

Fig. 81

the upper border of the root of the penis, that is to say, over the external abdominal ring. The whole of the spermatic cord except the vas deferens is pulled out of the wound (the veins are not laid bare, the spermatic fascia only being exposed) by means of an aneurism needle or a blunt hook which is passed around between the vas deferens and the rest of the cord. The essential point here is that the veins are not denuded, they are only seen through the translucent fascia; inside this fascia, with the veins, the spermatic artery is generally found. Having pulled the loop out through the wound in the manner mentioned, the next step is to tie a stout catgut ligature around the proximal end of the portion of the cord that has been drawn out. This having been done the distal (lower) part of the loop should be seized with pressure forceps and the loop divided below the upper ligature, a good stump being left. The portion gripped by the forceps is then turned back, separated from any fibrous connections which may happen to cling about it, and drawn out from the wound until the upper end of the epididymis appears. In advance of the epididymis there comes, arching up through the wound, a rounded, whitish cord, which is the vas deferens. Having seen the arch of the vas deferens projecting upward in this fashion, a second ligature is placed around the withdrawn portion of the plexus just above it, and the plexus is then severed above the ligature. All that remains is to unite the two stumps with kangaroo tendon or catgut; they are then returned and the wound closed.

In the following method the idea was to preserve as many veins as consistent with the purpose of the operation, and by all means also the spermatic artery. Experience, however, has prov-

en that in cases requiring surgical relief usually all veins of the pampiniform plexus are more or less ectatic; secondly, that the artery of the vas deferens anastomoses with the spermatic artery near the testicle; and thirdly, that the blood supplied by the former is sufficient to maintain the integrity of this organ. The steps of this older method as are follows:

1. Shaving and cleansing of the operating field.
2. Placing the patient in a half-sitting posture, in order to render the ectatic veins more prominent.
3. Incision two inches long into skin and tunica vaginalis.
4. Isolation of the manifestly diseased veins, and division of each vein separately between two catgut ligatures.
5. Suture of the skin wound and application of a gauze dressing secured by a suspending bandage.

RETENTION OF THE TESTIS.

The management of these cases depends upon the location of the malposition and on the condition of the organ. When the testicle remains in the abdomen, or when it is misplaced in the perineum, groin or the crural region, it does not deserve particular attention unless it annoys the patient or is injured by traumatism. It acquires, as a rule, complete functional capacity as if in a normal position and should be preserved as under normal conditions. It is different, however, with inguinal retention. Such testicles, if not descended before puberty, usually become atrophied or they are subject to circulatory disturbances and show a disposition to malignancy. If met with in boys under ten years of age and not complicated by an inguinal hernia it is oftentimes

Inguinal Retention

Atrophy and Malignancy

possible by massage and other manipulations to drag the ectopic testicle into the scrotum. This method is applicable to abdominal and inguinal retention. After the tenth year its results are very uncertain, mostly negative, and the points stated previously are grave enough to prompt operative measures, which generally means extirpation of the undescended testicle. **Massage**

The results of orchidopexy, an operation by which the testicle is drawn into the scrotum and there anchored, are often unsatisfactory and usually not permanent. The testicle returns into the inguinal canal or is drawn up tightly to the external inguinal ring, causing much suffering, or the tension to which the cord is exposed interferes with its circulation; indeed, necrosis of the testicle under these conditions has been observed. However, under Bevan's improved technique good results have been obtained in suitable cases. **Orchidopexy** **Pain—Necrosis**

The following conditions, to make a case a suitable one for operation, must be present:

The individual should be between six and twelve years old; the testicle must be in perfect health; it should not have been subjected to preceding severe or repeated traumatism and it should not be, or have been, attacked by inflammation. It may be under-sized, but should not be atrophied. **Cases Suitable for Orchidopexy**

Where these requirements are lacking, extirpation is indicated. **Extirpation**

A healthy inguinal testicle which, for mechanical reasons cannot be drawn down into the scrotum by operation, may either be extirpated, or, if the surgeon considers it safe, it can be retrodisplaced in the abdomen between the peritoneum and fascia; the latter procedure may become the operation of choice in the absence or atrophy of the other testicle. **Retrodisplacement**

Bevan's technique of orchidopexy is as follows: **Bevan's Method of Orchidopexy**

"An incision is made three inches long over the inguinal canal; this should never involve the scrotum nor extend farther inward or downward than the external ring. This incision should divide the skin, superficial fascia and the external oblique over the canal. The divided aponeurosis of the external oblique is drawn apart and the cremasteric fascia is exposed. This fascia and the thin underlying transversalis fascia is freely divided parallel with the canal and in this way exposes the large peritoneal sac containing the testicle and continuous with the general peritoneal cavity. This sac is opened and the testicle exposed to view. Frequently a projection of the omentum is found in the sac. The peritoneal sac is then cut across above the testis and is carefully separated from the cord which lies beneath it. The vaginal process is then ligated as in the neck of a hernial sac in an hernia operation, care being taken to ligate well up at the internal ring. That portion of the peritoneal sac in contact with the testicle is closed with a purse-string suture and thus forms the tunica vaginalis for the testicle. The testicle is now lifted out of its bed and the cord is gently pulled on so as to lengthen it as much as possible. In doing this, shortened bands of connective tissue will be seen as tense bands in the cord, and these should be torn across with tissue forceps. The cord should thus be stripped of all the surrounding fascia, leaving nothing but the vessels and the vas deferens. When this has been accomplished the spermatic vessels and the vas, which lies behind the posterior layer of peritoneum of the abdominal cavity, should be separated from the peritoneum by careful blunt dissection, with the finger introduced into the abdominal cavity. The spermatic vessels will be found passing upward and inward, and the vas downward and in-

ward from the internal ring, and this divergence can be plainly seen. The cord should be so lengthened by these maneuvers that the testicle can be layed on the thigh three or four inches below Poupart's ligament.

"With blunt dissection with the fingers, a large pocket should be made in the scrotum for the reception of the testicle, and the testicle dropped into it, where it should remain without tension on the cord. A purse-string suture should now be placed at the neck of the scrotum to retain the testicle in position. This suture should pass through the superficial fascia and the external oblique on both sides of the incision; that is, both the internal and external pillars of the external ring, and above the cord. When this suture is tied, the testicle is securely retained in its scrotal pocket. The incision is then closed, as in a Bassini operation, except that we do not transplant the cord; that is, we bring the conjoined tendon and Poupart's together above the cord. We then suture the incision in the external oblique with continuous suture, and, lastly, close the external wound. Catgut is employed for the buried sutures and horsehair for the skin sutures. A fairly firm, not uncomfortable, compress over the canal, retained with spica bandage, completes the operation. The horsehair sutures are removed on the tenth day, the patient allowed on his feet on the fourteenth day." (*Bevan.*)

Functional Results Unsatisfactory

I doubt very much that anything is gained, as far as the functional result is concerned, if the operation for undescended testicle be performed after puberty. In rare cases the spermatogenetic power was apparently preserved, but these are the exceptions.

TORSION OF THE CORD.

It is oftentimes difficult to diagnose and differ-

entiate torsion from acute conditions displaying similar symptoms, but it is unnecessary to waste much time in the attempt at diagnosis. The symptoms demand an early operation, which likewise would have to be performed for the relief of the other acute conditions. By unnecessary delay a testicle which could have been saved will inevitably be destroyed, just as a strangulated hernia, which was amenable to liberation and reposition, will become hopelessly gangrenous. If the testicle, after being exposed, is not found to be gangrenous or threatening to become so, it should be returned to its normal position and anchored by catgut sutures to the lowest point of the scrotum to avoid recurrence of the trouble. If the testicle is found gangrenous, it should then be removed. If the organ looks suspicious the cord should be untwisted, the wound around the testicle loosely packed and the case closely watched for a few days. Should the testicle recover the scrotal wound can be closed in the usual manner by a secondary suture in two layers.

Surgical Relief Urgent

Gangrene

It may not be out of place to mention the possibility of torsion of a testicle retained or replaced in the abdomen, and the similarity of the symptoms of this condition with appendicitis. The absence of the testis in its normal bed should not leave one in doubt very long.

Symptoms Resembling those of Appendicitis

ACUTE ORCHITIS.

The treatment is mostly identical with that of acute epididymitis. To be sure the elevation and immobilization will not afford so much relief as in epididymitis, because in the former the pain is due to the tension inside of the albuginea, while in the latter it is caused by dragging on the inflamed cord, and therefore in orchitis one has to rely much more on anodynes. If suppuration becomes evident the abscess should be opened by a free in-

Anodynes

cision. The canaliculi seminales are not always destroyed by the inflammatory process, nor necessarily by an opening in the albuginea. This can be guarded against by almost complete closure of the wound in the albuginea after the pus has been evacuated. **Suppuration** **Suture of Albuginea**

Orchitis as a complication of malaria should be treated like the latter; rheumatic orchitis like rheumatism elsewhere; syphilitic orchitis, constitutionally. The treatment of mumps-orchitis can only be symptomatic; atrophy frequently follows. **Malaria, Gout and Syphilis as Causative Agents**

CHRONIC ORCHITIS.

Chronic orchitis is sometimes associated with abscess formation for which, etiologically, as a rule, tuberculosis is responsible. The abscess may be opened and treated the same as any other suppurative process if at least part of the testicle be intact, but this is rarely the case. The septa are usually found much thickened; the parenchyma destroyed by a diffuse inflammatory process; and it is best to remove the testicle. **Tuberculosis**

TUBERCULOSIS OF THE TESTICLE AND EPIDIDYMIS.

The most extreme views are held concerning the management of tuberculosis of the uro-genital tract in general, and of the epididymis and testicle in particular. Some are ultra-conservative and against any surgical interference whatsoever; others favor not only castration but they combine with it the extirpation of the vas deferens, seminal vesicles and even the prostate. Much of the final result of either method depends on the stage and extent of the disease, the patient's general constitution, and his environment. In the pre-caseous stage general hygienic measures as accepted for the treatment of tuberculosis seem to check the disease or at least retard its progress. Spontaneous healing of nodules which have become cheesy **Precaseous Stage** **Spontaneous Cure**

is also observed, but relapse is just as frequent. Cases with one or two nodules in the epididymis are considered suitable for conservative surgery —removal of the nodules—but in extensive involvement of the epididymis and the testicle castration is indicated, and with it the excision of the greater portion of the vas deferens.

Castration

Remote Foci

No lasting benefit can be expected from castration where simultaneously tuberculous foci exist in other organs. However, if the testicle and the scrotum are badly disorganized and penetrated by a mass of pus-discharging sinuses, the extirpation of the whole mass will give the patient some relief.

When performing the operation the inguinal canal should be opened, the vessels of the cord secured by double ligation at the inguinal ring, the vas deferens separated and divided by the thermo-cautery as high up as possible. It should not be torn off by undue force nor by twisting, as it is bound to break just at its weakest (diseased) point, and dissemination of tuberculous material from there is the natural consequence. The total extirpation of the testicle, vas, seminal vesicles and the prostate, as recommended, is too radical a procedure and is hardly ever justifiable.

Passive Congestion

The good results following the Bier method (passive congestion) in tuberculosis recommend its employment in tuberculosis of the epididymis and indeed decided improvement has been observed in a few cases treated by constriction of the diseased organ. In others no effect on the process was noticeable. Possibly this method is indicated in primary tuberculosis of the epididymis, but not in the descending type.

SYPHILIS OF THE TESTICLE.

Constitutional Treatment

Under a constitutional plan of treatment, together with local applications of mercurial ointment, or plasters, even advanced lesions, such as

fungus testis and broken down and ulcerated gummata, heal surprisingly well and rapidly. In extensive destruction of the testicle castration is indicated.

Castration

TUMORS OF THE TESTICLE.

It is difficult to differentiate between malignant and benign tumors of the testicle. For practical purposes it is important to know that the majority of these tumors are either syphilitic, tubercular or malignant. If doubt exists as to the diagnosis, a treatment with mercury and potassium iodide should for a few weeks precede operative measures. Castration is indicated if these measures fail to reduce the size of the growth within a few weeks. Unfortunately the pelvic glands are frequently involved at the time the operation is performed, which often accounts for the unsatisfactory ultimate results.

Mercury and Iodine in Doubtful Cases

CHAPTER VII.

DISEASES OF THE BLADDER.

RUPTURE AND WOUNDS OF THE BLADDER.

The indications for treatment under these circumstances, which can only be surgical, are:

1. To prevent, or at least check, further leakage of urine in the prevesical space and the peritoneal cavity;

2. To establish free drainage from the tissues already contaminated or infiltrated by the escaped urine; and

3. To eliminate the function of the bladder as a urine reservoir for several days.

The sooner these steps are taken after the injury the better are the chances for a recovery.

Extraperitoneal Injury

If the tear is extra-peritoneal, it can be closed by suture and a catheter tied in the bladder; or the bladder wound may be left open and utilized for suprapublic drainage. The prevesical space should be evacuated of coagulated blood, irrigated and also drained through the partially sutured abdominal wall.

When infiltration in the perineal region appears, the part must be incised to establish free drainage for the extravasated blood and urine, and a catheter tied in the bladder through a perineal opening made in the urethra.

Intraperitoneal Injury

If the tear is intra-peritoneal and peritonitis has not yet set in, it is advisable to change the wound from an intra-peritoneal to an extra-peritoneal one. The peritoneum around the tear may be lifted up and the peritoneal part of the wound

sutured, while the vesical part may be closed by suture or drained as the surgeon deems advisable. If peritonitis has developed or is considered probable, the bladder wound should be closed, a catheter tied in the bladder and the peritoneum and prevesical space drained.

Fallacy of Catheter Test

It may not be out of place to state that because urine can be drawn by catheter is no proof of the absence of a vesical tear following an injury. This might be due to the fact that the rent in the bladder wall is very small and so situated that at least a part of the urine remains in the bladder, or the catheter may pass through a large rent in the cavity containing the extravasated urine outside of the bladder. An error in this direction will have disastrous consequences.

EXSTROPHY OF THE BLADDER.

Various methods intended to correct this congenital defect have been tried with variable success. Some have endeavored to close the abdominal opening by plastic operations; others have followed the idea of deflecting the urine from the open, rudimentary bladder. The implanation of the ureters in the lumbar region, or in the abdominal wall, has been very unsatisfactory. Better results have been obtained by implantation of the ureters, with the surrounding part of the trigone, into the sigmoid flexture. By this method the sphincter apparatus of the ureteral orifices remains intact, and in this way hydronephrosis caused by stricture of the ureter, and ascending renal infection due to absence of this sphincter, can be avoided, the latter for some time at least.

VESICAL VALVES.

Regular and aseptic catheterism is a palliative procedure for the relief of retention caused by valve formation. As a radical procedure the

galvano-caustic division with the Bottini incisor may be employed; or the obstructing band may be split through a suprapubic opening. To prevent reunion of the cut surfaces the author would recommend the excision of a part of this band.

VESICAL DIVERTICULA.

These do not require treatment unless infection occurs, in which event they render a cystitis especially obstinate, as it is very difficult to eradicate the trouble in the diverticulum, from which reinfection of the bladder takes place. This necessitates resection of the diverticulum, which is performed by the separation of the peritoneum from the bladder, excision of the sac and suture of the wound in two layers. If the ureteral orifice is in the operating field, the ureter may be divided and reimplanted in the slit left after excision of the diverticulum.

VESICAL CYST OF THE URETER.

The treatment here resembles that of prolapse of the female urethra. The bladder should be opened suprapubically. After securing the mucosa of the cyst with guide loops tied in a slip knot, the tumor is cut off in front of the loops and the latter tied.

DISPLACEMENT OF THE BLADDER AND CYSTOCELE.

With the exception of the displacement of the bladder into a hernial sac, this anomaly is found exclusively in the female sex. The treatment should be directed to the cause. Deviation of the uterus must be corrected and tumors removed.

Cystocele caused by the traumatism of labor can to a certain degree be relieved by a suitable pessary, but radical help can only be expected from operative procedures. In milder cases the excision of an elliptical piece of the vaginal wall covering the bladder is sufficient. A large cystocele requires vagino-fixation of the uterus.

CYSTITIS.

Definition

In the treatment of cystitis, irrespective of any conventional classification, we have to bear in mind that the disease is merely a symptom of some underlying pathological lesion; that every true cystitis is of bacterial origin; and that "simple cystitis" is only a theoretical condition.

Prophylaxis

Since the mode and avenues of infection have become better known, and since it has become established that traumatism and infection by instruments is a contributing cause of cystitis, much has been accomplished in the way of prophylaxis. This latter source of infection (by instruments) can be and is successfully eliminated by extreme cleanliness; asepsis and antisepsis in everything that comes in contact with the urethra; by cleansing the latter and the bladder preceding and following the use of instruments; by preventing stagnation of urine in the bladder; and by exercising better care of the urinary tract during labor and avoiding traumatism during gynecological operations.

Indications for Treatment

The principal indications for the treatment of cystitis are:

1. To remove the cause.
2. To relieve pain and frequent urination.
3. To modify the character of the urine so as to make it an unfavorable medium for the development of pathogenic microbes, and
4. To check suppuration.

Rest

In the acute stage, as in many other local inflammations, rest in bed should be insisted upon until the symptoms are well under control. The

Diet

food should be bland and consist largely of fluids

Liquids

in small quantities, milk, or milk mixed with Vichy being preferable. The still customary ingestion of large quantities of fluids in acute cys-

titis should be discouraged, as it only increases the congestion of an inflamed organ, which is much in need of rest. Attention should be given to the bowels. A purge of calomel and pulverized jalap, 0.3 (grains five) of each, followed by a wineglassful of magnesia citrate, answers the purpose.

Purgation

A hot Sitz bath of 105° F., repeated several times daily, if necessary, will afford much relief from pain and tenesmus. Hot fomentations applied to the perineum and above the pubes are almost as efficient; likewise sitting over steaming hot water. In addition an anodyne is often necessary to control the vesical tenesmus, pain and irritability. The remedy par excellence is opium and its alkaloids. It should be given by mouth or rectum. If given by mouth the addition of fol. uvæ ursi, or the time-honored linseed decoction with salol, will be found serviceable.

Sitz Bath

Fomentations

Opiates

℞

Decoct. sem. lini. or (infus. fol. uvæ ursi),	150.0 (℥v)
Salol,	4.0 (gr. lx)
Tinct. opii,	gtts. xx
Syr. simp.,	30.0 (℥i)

M.

S. A tablespoonful every two hours.

Dose and Administration

For suppositories the extract of opium should be combined with the extract of belladonna or with morphine:

℞

Extract opii,	0.18 (gr. iiss)

Or

Morphine sulphate,	0.08 (gr. iss)
	(gr. iss)
Extract of belladonna,	0.06 (gr. i)
Olei cacao,	6.0 (℥iss)

M. Ft. suppositories No. six.

S. One suppository twice to three times a day.

Balsams
Santal Oil
Pichi Pichi
Gonosan
Santyl
Buchu
Herniaria

The balsams, oleum santali, fluid extract of pichi pichi, gonosan (a combination of kava kava and purified sandalwood) and lately santyl, all have a sedative effect in acute cystitis. The foliæ uvæ ursi, the folia buchu and the herba herniariaræ are also useful. They should be taken as infusions, either singly or in mixture of equal parts of these herbs, about a heaping tablespoonful to a large cup of boiling water. Gonosan is nearly free from the disagreeable effects of sandalwood oil, and to avoid the unpleasant eructations should be taken on a full stomach, and very little of fluids consumed during or soon after the meal. The dosage is two or three capsules (each containing ten minims) three times daily. It is especially efficient in gonorrheal cystitis. So is santyl in the same dose. Santyl on account of being almost tasteless may also be prescribed in the following way:

℞

Oil santyl,	15.00 (℥ss)
Pulv. gum tragacanth,	7.50 (ʒii)
Syrup simple,	45.00 (℥ss)
Aqua, q.s.,	120.0 (℥iv)

M.

S. Teaspoonful three times daily.

(Each ʒi represents 11½ drops oil santyl.)

Urinary Antiseptics

Sometimes it will be necessary to give internal antiseptics in order to attack the root of the evil. The most commonly employed remedies of this class are salol, camphoric acid, boric acid, benzoic acid and last, but not least, urotropin. Salol may be given in doses of 0.5 to 1.0 gm. (7 to 15 grains) three times daily. Being a phenol derivative it should not be prescribed where kidney lesions exist.

Salol

A combination of the antiseptic and astringent qualities occurs in the following formula:

℞

Salol,
Extract of uva ursi sicc.,
āā 5.0 (℈iv)

M. Ft. pill No. XXX.

S. Two to three pills three times daily.

Boric Acid

Boric acid, to be effective, should be taken in doses of 0.5 to 1.0 gm. (7½ to 15 grains), several times a day, but occasionally, it must be remembered, this may cause toxic symptoms such as exanthema, albuminuria and extreme weakness.

Camphoric Acid
Benzoic Acid

The dosage of camphoric acid is 1.0 gm. (15 grains) three times a day; of benzoic acid 0.3 to 0.5 (4½ to 7½ grains) three times a day. Both have a marked deodorizing effect on ammoniacal urine, but distress the stomach if given for a long time.

Urotropin

In urotropin we possess the strongest urinary antiseptic of more recent date. However, it does not seem to have any effect on the gonococcus or the bacillus tuberculosis. It requires an acid urine in the renal pelvis in order to develop its active principle, formaldehyde, but the latter, after being once liberated, acts alike in acid or alkaline urine. In the cystitis of typhoid fever, it is, so to say, a specific. It is given in doses of 0.3 to 0.5 gm. (4½ to 7½ grains) twice to three times daily and should always be dissolved in a few ounces of water. It may be used for weeks and even months without any ill effects. Occasionally its administration may be attended by toxic symptoms, which are comparatively frequent when the drug is not properly diluted. The development and the degree of the toxic effect is not always correlative with the size of the dose. Among the toxic symptoms may be noted irrita-

Dose and Administration

Toxic Symptoms

tion of the stomach, diarrhea, abdominal pain, exanthema, ringing in the ears, albuminuria, hematuria and strangury—the latter the result

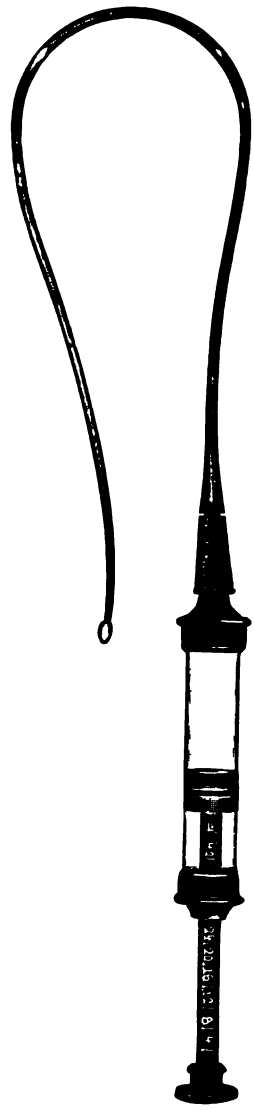


Fig. 85.

of contact with raw surfaces (ulcerations). These symptoms subside readily with the discontinuance of the drug.

Local Treatment

After the acute symptoms of cystitis have subsided—usually within a few days—local treatment of the bladder frequently becomes necessary to remove the cause of the trouble or to cure a lingering congestion of the mucosa. Here either an exacerbation of a chronic cystitis, tuberculosis, gonorrhea, or ulcer of the bladder call for topical applications, which may be either antiseptic or astringent, oftentimes combining both qualities, or anodynes combined with antiseptics. These medicaments are employed as instillations or injections. In the subacute stage only instillations are advisable and only soft instruments of small caliber should be introduced. The most suitable instruments are a graduated syringe holding four cc. (one drachm), and a gum elastic capillary bougie (Guyon's instillator). Owing to the intolerance of the inflamed bladder wall to tension, only small quantities can be used, and the medicinal solution should be applied drop by drop. The smallness of the quantity permits a stronger concentration than could be used in the form of an injection without being followed by severe irritation, and this circumstance makes the method so much more efficient.

Instillations

Silver Nitrate

Bichloride

Gomenol

Iodoform

Guaiacol

Most commonly employed for instillations, and very efficient, are one-half to five per cent. solutions of silver nitrate; 1 in 3000 to 1 in 500 solutions of bichloride of mercury; ten to twenty per cent. gomenol oil and one to ten per cent. suspensions of iodoform. The latter also combined with guaiacol in the formula of Pirot:

℞

Iodoform,	1.0 (gr. xv)
Guaiacol,	5.0 (℈iv)
Oleum benne steril,	100.0 (℥iii)

M.

4 cc. (one drachm) of this suspension, once daily, may be used.

Quantity and Frequency of Instillations

Of the silver nitrate and bichloride of mercury solutions, it is the rule to decrease the quantity and increase the intervals between instillations with the concentration of the solutions. For instance, an instillation with a 1 per cent. silver nitrate, or a 1:5000 bichloride solution should not exceed two cc. (½ drachm), and may be given once daily, while a two per cent. silver nitrate, or a 1:3000 bichloride, solution should not exceed one cc. (¼ drachm) and may be given once every other day. Not more than six drops of a three to five per cent. silver nitrate, or a 1:2000 to 1:1000 bichloride of mercury, solution should be used, and these not oftener than once in three to five days.

Silver nitrate is most valuable in the treatment of cystitis and, so to speak, may be regarded as a specific in gonorrheal cystitis.

Bichloride of mercury is more effective in cystitis caused by a mixed infection.

Argyrol

In subacute cystitis, argyrol in ten to twenty-five per cent. solutions may be used for a while, when the bladder is still intolerant to silver nitrate; its qualities as a gonocide, however, are inferior. Stronger in this respect than argyrol, and yet much less irritating than silver nitrate,

Nitric Acid

is nitric acid, in one-half to one per cent. solutions. A five per cent. gomenol mixture is also very beneficial in this stage.

Irrigations

In the more chronic stage, irrigations of the viscus become necessary, when the viscid pus or mineral deposits clinging to the bladder wall call for a thorough cleansing preceding other topical applications. But even then one should never inject more than two ounces at a time, because the bladder muscle reacts differently toward slow and rapid tension, a fact of which one may convince himself by rapidly filling a normal bladder

with ten ounces of fluid. There will be tenesmus for quite a while afterward while the same bladder does not take notice of such a quantity if

Fig. 86.

accumulated in the natural way and time. The result of such rapid filling of a diseased bladder

is seen in renewed congestion and secretion, and many times a protracted cystitis is due to this procedure. Moreover, the cleaning of the bladder wall is much more thoroughly accomplished by small and repeated flushings than by a few large ones. For all these reasons a sterile piston syringe is preferable to the much employed irrigation can.

Chinosol Pyoktanin

Chinosol and pyoktanin in a solution of 1:4000 have a marked deodorizing effect on very offensively ammoniacal urine. Four cc. (one drachm) of a five per cent. iodoform suspension most effectively checks ammoniacal decomposition of the urine, but the strong odor of the remedy prevents its general adoption outside of a hospital.

Salicylic Acid

Salicylic acid in a concentration of 1:3000 dissolves phosphatic débris and renders an alkaline urine neutral or slightly acid. A saturated solution of boric acid, or a solution of 1:3000 of acetate of lead, has a soothing effect in simple congestion of the mucosa associated with a mucous secretion, but it is of little antiseptic value.

Boric Acid

Acetate of Lead

Alcohol

Alcohol combines antiseptic, astringent and deodorizing properties, and if properly diluted with water it is free from irritation. The strength of the solution at first should be three per cent., gradually increasing it until it reaches ten per cent. Not more than 300 c. c. (ten ounces) should be used in one treatment, and the last 30 c. c. (one ounce) of the solution may be left in the bladder.

Bichloride

Silver Nitrate

Nitric Acid

Bichloride of mercury solutions should be injected in concentrations from 1:5,000 down to 1:20,000; silver nitrate from 1:10,000 to 1:1,000; and nitric acid from 1:6,000 to 1 in 3,000. From 250 c. c. (eight ounces) to 1,000 c. c. (one quart) of the liquid may be used at one treatment in the manner described before, and regarding quantity and intervals one should be guided by the same

principles as stated for instillations. If the injections are followed by much tenesmus, flushing with a warm normal salt solution gives immediate relief. **Tenesmus**

The antiseptic and non-irritating qualities of collargol (colloidal silver) suggests its employment in cystitis. After cleansing the bladder with warm water, 50 to 100 cc. (one and a half to three ounces) of a one to two per cent. solution of collargol may be injected and retained even for hours. **Collargol**

Every topical application should be made to an empty bladder. Silver nitrate and bichloride of mercury precipitate albumen, and it is, therefore, necessary to clean the viscus thoroughly with sterile water preceding every such application.

Silver nitrate is contraindicated in tuberculosis of the bladder, in multiple or extensive ulcerations, and in a contracted bladder.

In urethro-cystitis in the male the posterior urethra is included in the treatment in the following manner: **Urethro-cystitis**

In the subacute type. After having deposited the required quantity of the medicated solution in the bladder, the tip of the capillary catheter is to be withdrawn for about one inch (which brings it to the center of the deep urethra), then two to four cc. (½ to 1 drachm) of the same solution are injected and the instrument removed.

In the chronic type. A silkweb or Nelaton catheter is passed into the bladder, the latter emptied, and the medicinal fluid injected. The catheter is then withdrawn util no fluid from the bladder escapes through it. This indicates that the eye of the catheter has left the bladder and rests in the deep urethra just below the internal sphincter. Fluid injected now escapes from the eye of the catheter into the deep urethra and towards the

external sphincter (compressor urethræ). This striated muscle closes tightly around the catheter, preventing the downward flow of the fluid, which then runs upward and backward into the bladder unchecked by the less resistant vesical sphincter (a non-striated muscle). The desired quantity having been injected, the catheter is again introduced into the bladder and the latter emptied.

This procedure may be repeated until the bladder is filled for the last time, whereupon the catheter is withdrawn and the patient allowed to empty his bladder.

If performed for mechanical cleansing the injection should be repeated until the fluid returns clear.

Frequency of Treatment

The frequency of injections depends on the severity of the symptoms, on the quantity of pus secreted, the rapidity of its re-accumulation, and on the degree of infection. Sometimes two injections a day are required, sometimes one, and in very mild cases perhaps but one every other day.

Procedure in Over-distended Bladder

The complete contraction of a bladder which has been over-distended for a time, or which is very sensitive, causes much pain, and the method of injecting then has to be modified. The bladder is not completely emptied, but a small amount of urine is left and not more than sixty c. c. (two ounces) of the medicinal fluid injected. The same quantity is withdrawn and again sixty c. c. of fluid injected, and this procedure repeated over again until the fluid returns clear. In this way the cleaning of the bladder is gradually accomplished without any discomfort or pain.

Continuous Catheter

In other forms of chronic cystitis complicated by urine retention and fever the injections, even when repeated several times daily, do not improve the local and general condition sufficiently. In these cases it is imperative to prevent the accu-

mulation of even the smallest quantities of urine, for a while to exclude the bladder from its function as a reservoir. Injections through the continuous catheter (Pezzer or Malecot) serve this purpose admirably. Very soon the urine clears up, the fever subsides and pain and tenesmus disappear.

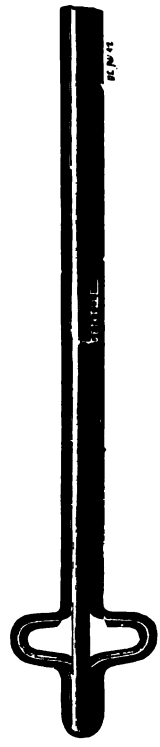


Fig. 87. Malecot catheter.

Chronic Cystitis in the Female

Quite a number of cases of cystitis in women, which is characterized by persistence and frequent relapse, are due to a chronic inflammatory condition in the trigone and the vesical neck, associated with metaplasia of the epithelium. Relief and oftentimes a complete cure is effected by topical applications with five to ten per cent. silver nitrate, or ten per cent. argentamine solu-

Urethroscopic Treatment

tions, through the urethroscope. The application should be made in the empty bladder and in order to keep the urine from the trigone, as it pours from the ureters, during the treatment, it is advisable to place the patient in a slight Trendelenburg position. Rather vigorous friction of the diseased area with the medicated swab is necessary to obtain the full benefit.

Colicystitis

Colicystitis of hematogenous origin, or caused by direct immigration of the bacillus from the intestines or other adjacent tissues into the bladder, is effectively combatted by the internal administration of urotropin, together with vesical injections of two per cent. collargol, or 1-20,000 bichloride. The doses of urotropin in these cases must be larger than usual, one gm. (fifteen grains) may be given twice or three times daily. Even after all subjective and objective symptoms have disappeared, the urotropin medication should be continued for several weeks in order to forestall a recurrence. Of course, wherever possible, the primary cause of the trouble must be given proper attention.

In women colicystitis is frequently due to the direct immigration of the bacillus into the bladder by way of the urethra from the vagina, which latter abounds with the coli organisms in a saprophytic stage. Naturally this source of the trouble would have to be traced and prophylactic measures taken to check further infection or recurrence.

Rebellious Cystitis

In those rare cases of rebellious chronic cystitis in women which resist all topical applications, the forcible dilation of the vesical sphincter is occasionally followed by immediate and lasting relief. Before performing the operation, a thorough cystoscopic and gynecologic examination, as well as

Forcible Dilatation of Sphincter Vesicae

a study of the urine, must exclude other possible lesions which could be etiologically responsible for the failure of the preceding local measures.

Vesical Ulcer

Superficial simple ulcers oftentimes yield to instillations with gomenol oil—five to fifty per cent. —given daily and as improvement becomes apparent every second or third day. The treatment, however, extends over four to eight weeks. Stronger but extremely painful are instillations with a five per cent. silver nitrate solution. Its application may be rendered less irritating by a preparatory treatment with an iodoform suspension, and by an injection of a one per cent. sodium chloride solution following the instillation with silver nitrate: If this treatment should fail operative procedures, curetage or excision must be resorted to. This necessitates suprapubic cystotomy. Only superficial ulcerations of the mucosa are amenable to the same treatment (curettage) which, in exceptional cases, can be performed through the operation cystoscope. Serviceable instruments for this purpose are the operation cystoscopes of Latzko, Casper and Bransford Lewis. Latzko's instrument consists of an ordinary direct view cystoscope and a number of slender curettes, scissors, and cautery points which are introduced alongside of the cystoscope. This arrangement permits a wider range of using them in the bladder than can be done when these instruments have to be introduced through a channel in the cystoscope. However, Latzko's instruments, just on account of this arrangement, can only be used in the female bladder. Casper's operation cystoscope cauterizes very effectively, but has no provisions for the employment of a curette. Bransford Lewis' instrument is perhaps the most complete and most serviceable of all.

Curetting

Deeper lesions may be excised and closed by

Excision

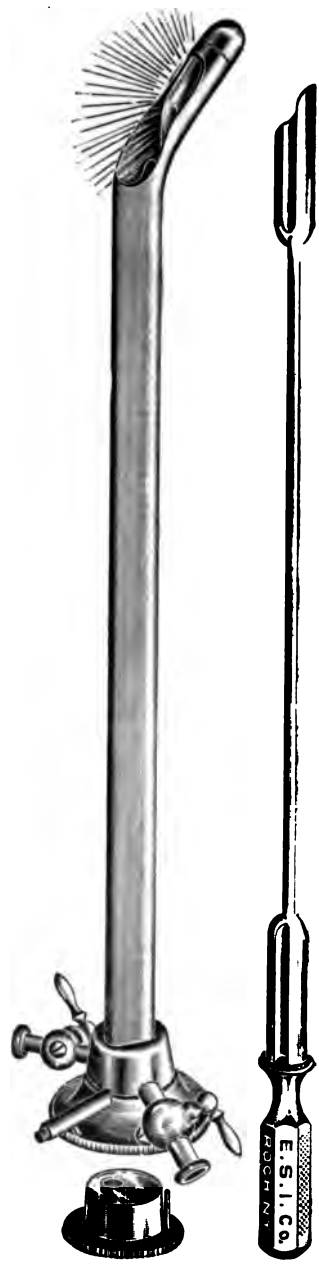


Fig. 88. "Bransford Lewis'" operating cystoscope.

Fig. 89. "Bransford Lewis" operating cystoscope accessories.

sutures, or the defect cauterized, and the bladder packed with iodoform gauze, for two days, followed by drainage for several weeks.

Vaginal Cystotomy

The female bladder can be made accessible through the previously dilated urethra, but the result is rarely satisfactory because the lesions have to be exposed to view in order to be thoroughly reached. Entrance to the female bladder through the vagina (vaginal cystotomy) is hardly superior to the urethral route but in extensive ulceration (cystitis dolorosa) it gives more satisfaction because it matters little if a few small islands of normal vesical mucosa are removed in

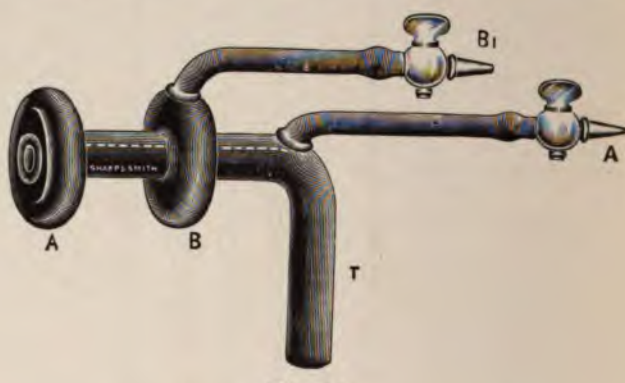


Fig. 90.

the general sweep of the curette. After the operation the bladder should always be packed with iodoform gauze for several days. (The technique of vaginal cystotomy is described elsewhere.)

Urinary Fistula

Hopeless cases of chronic cystitis are to some degree benefitted by a permanent fistula, in women established in the vagina, in men, suprapubically. Such a fistula, however, exposes the patient to the danger of serious infection from without; it requires much attention and care, and causes inconvenience by the almost inevitable urine leakage. In recent years, a suitable prothesis for women has been devised which keeps them fairly dry.

The author's apparatus for suprapublic fistula has been in satisfactory use for a number of years.

With the use of this apparatus drainage of the bladder is so complete that the leakage of urine

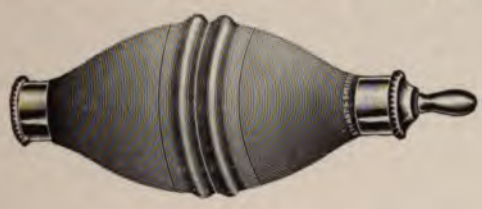


Fig. 91.

along the sides of the tube, perpetual wetting and consequent discomfort of the patient, is reduced to a minimum.

The fact that the various sections of these tubes are constructed of soft rubber places gives a

Fig. 92.

preference to other methods of drainage, prevents possible necrosis and alleviates the pain due to the unyielding pressure of the tubes made of hard rubber or metal against the walls of the fistulous canal and the bladder.

The tube (Fig. 90) may be employed for all varieties of bladder fistulæ and especially in all cases complicated with prostatic hypertrophy or tumors of the prostate and bladder.

The distal end of this tube is an air cushion (A) with a central opening, which, after being inserted into the bladder, is inflated through the cut off "A."

The cushion "B" of this apparatus can be slipped over the tube and placed close to the outer

Fig. 93.

opening of the fistula, where it is retained by being distended by means of the inflator. In order to close up the fistulous tract as completely as possible the inflated distal end should be drawn snugly toward the vesical opening of the fistula before air cushion "B" is slipped down to the abdominal opening.

A protecting shield (Figs. 92 and 93) is employed to reduce the possibility of urine leakage owing to imperfect adjustment of the two cush-

ions. The shield consists of two sections, viz., an inflatable soft rubber cushion and an outer nickel shield, the lower aperture of which is made to receive the proximal end of the tube. (T).

The edge of the lower section inflated through a stop cock is held in position by the metal shield, which latter is supplied with a three-inch elastic belt and perineal straps.

The various parts of this apparatus permit a thorough sterilization by steam or formaldehyde.

Importance of Cystoscopy

The importance of cystoscopy in all cases of chronic cystitis cannot be emphasized too strongly; without it a well directed treatment is impossible; and it should be employed in every case which, after a reasonable time, does not yield to routine measures.

Without the aid of cystoscopy we may pour gallons of fluid into the bladder without curing a chronic cystitis due to a vesical stone, to an enlarged prostate, a perivesical abscess, tumor, or an infection of the upper urinary tract.

Vesical Symptoms Incited by Rectal Disorders

It should also be remembered that rectal diseases, piles, fissures, fistula and ulcerations, produce vesical symptoms, sometimes so marked as to overshadow the real cause. The same is true of diseases of the female genitals, and of other pelvic derangements.

TUBERCULOSIS OF THE BLADDER.

Primary Tuberculosis

In primary tuberculosis of the bladder, a condition which is quite rare, so rare, indeed, that its existence is doubted by many, local applications supported by general hygienic measures give very satisfactory results. In the ulcerative stage daily instillations with the previously mentioned gomenol oil, or iodoform-guaiacol suspension, combining antiseptic and anodyne qualities, are indicated and helpful. After the ulcerations have become clean and the subjective symptoms better,

Hygienic and Local Treatment

Iodoform-Guaiacol Gomenol

Bichloride

alternating instillations with either of the above mentioned preparations and bichloride of mercury may be employed—one day the iodoform-guaiacol or gomenol, the next day, the bichloride. When the latter is used in concentrations of from 1 in 2000 to 1 in 1000, it is necessary to put an interval of three to four days betwen each bichloride instillation, which interval may be utilized for iodoform-guaiacol or gomenol applications, or, as the local conditions improve, a day or two may be allowed to pass without any treatment.

Secondary Tuberculosis

Secondary tuberculosis of the bladder, usually due to tuberculosis of the kidney, is not amenable to local treatment. It requires for its cure the extirpation of the diseased kidney, provided there

Nephrectomy

is another kidney and the latter is functionally intact. This fact can be established by catheterization of the ureters, combined with kryoscopy. Very often the local lesions in the bladder disappear, even without any treatment, soon after the diseased kidney is removed. In other cases the trouble in the bladder remains unchanged after nephrectomy, and again in a few others it progresses notwithstanding the preceding operation and subsequent local treatment.

The prognosis in the ascending form of vesical tuberculosis is not as favorable as in the descend-

Castration

ing type. Even after removal of the testicle and the seminal vesicles, the process in the bladder does not come to a standstill. As a last resort, to alleviate the agonies of pain and urinary distress, a suprapubic fistula may be established. In very rare instances cures by this measure have been observed.

Frequency of Vesical Tuberculosis in Women

The results of surgical intervention in secondary tuberculosis of the bladder would perhaps be more satisfactory if the condition were recognized earlier than is generally the case. Every cystitis

which is not due to gonorrhea or caused by infection from without, is most likely induced by tuberculosis, particularly so in women. Here the symptoms of cystitis are easily misinterpreted as caused by a displacement of the uterus which happens to be palpated, or by a cystocele, or by diseases in the adnexa.

Importance of Early Diagnosis

A thorough examination of the sediment collected from large quantities of urine, especially those obtained by catheterization of the ureters, and an inoculation test will invariably lead to the right track even if there are very few bacilli present. It is also important to know that the tubercle bacillus strongly counteracts the urea-decomposing germs and that, therefore, an acid urine in the presence of these germs should suggest the probability of tuberculosis of the kidney or bladder.

Tuberculin Test

The opinions on the value and harmlessness of the tuberculin test are still at variance. In employing it we proceed in the following manner:

Inject one-half milligram (1-120 grain) of tuberculin hypodermically. This should be followed by a rise of temperature of several degrees within ten hours if the process in the urogenital tract be of a tuberculous nature. However, one should not be satisfied with the negative result of a single injection. Within twenty-four hours the test may be repeated with one milligram of tuberculin and this procedure eventually carried to the injection of five milligrams. If then the reaction fails to appear tuberculosis may be excluded.

TUMORS OF THE BLADDER.

The treatment is curative or palliative. The radical methods are:

1. Removal of the tumor from the bladder wall.

2. Extirpation of the growth, including a part of the bladder wall.

3. Complete resection of the bladder.

For these operations the suprapublic route should be selected. Pedunculated tumors may be removed by a circular incision in the healthy tissue around the base, and the defect in the mucosa closed by fine, catgut sutures. Malignant infiltrating tumors require resection of a part of the bladder wall. If the ureter has to be included

Fig. 94. Author's case. Actual size of two papillomata with slender pedicles rooting close to the left ureter.

in the excised portion, it is severed and reimplanted in the opening left by the excision.

The results of complete extirpation of the bladder are discouraging, just as much as the condition inviting the operation is a hopeless one.

Operation-Cystoscope

The removal of vesical tumors through Nitze's operation cystoscope has a very narrow field of usefulness. Nitze, himself, limited its indications to benign tumors, but he stated that it was impossible to decide this point from gross appearance, nor always from a microscopical study of

the villæ. It is furthermore uncertain to determine how deep the effect of the cauterization of the base reaches, after the bulk of the growth has been removed by the snare. One should also not forget that numerous sittings are required to remove sessile tumors, causing the entire procedure to extend over many weeks. It is not difficult to appreciate the consequences following these manipulations, and the valuable time lost if the growth happens to be a malignant one.

Palliative Treatment

Palliative treatment is reserved for far-advanced and inoperable malignant growths, to relieve the vesical distress, pain and hematuria.

Anodynes

For the pain anodynes (morphine, opium and belladonna) are serviceable, either in the form of suppositories, hypodermically or by mouth.

Cystitis

Cystitis, which is usually associated wth vesical tumors in the later stages, is to be treated accordingly.

Hemorrhage

The very bothersome and vitality-sapping hemorrhages can be controlled in two ways:

Silver Nitrate

Vesical injections with 1 in 1,000 silver nitrate solutions cause an eschar over the bleeding surface and stop the bleeding for awhile. Ten per cent. gelatine injections may also be employed; they are not irritating like the silver nitrate. At first 100 cc. (three ounces) are injected, retained for five minutes and then withdrawn to make room for a second injection with the same amount, which is left in the bladder. Calcium chloride in doses of 0.3 to 0.6 gm. (five to ten grains), given internally, three or four times a day for a few days, seems to arrest hemorrhages for quite awhile.

Gelatine

Calcium-Chloride

Continuous Catheter

The continuous catheter might be the most efficient and most desirable means to this end, but when introduced during a hemorrhage it becomes obstructed by clots of blood, which have to be re-

moved either by irrigation or by withdrawal of the catheter, which again produces bleeding, so that, ultimately, we have to resort to suprapubic or vaginal drainage with or without partial removal of the tumor and curettage and cauterization of the remaining part. While no cure can be expected, this procedure prolongs the patient's life by checking hemorrhage and giving him comparative physical comfort.

Cystotomy

VESICAL CALCULI.

The treatment here is purely mechanical and consists in the removal of the calculus or calculi from the bladder. This may be accomplished in two ways:

1. By crushing—litholapaxy.
2. By cutting—suprapubic or perineal cystotomy.

Fallacy of Giving Solvent Drugs

The problem of dissolving a concrement by vesical injections of solvent drugs, or by internal medication, has remained a problem up to the present time, and doubtless will so continue.

Litholapaxy

Litholapaxy, or the crushing of the stone and removal of the fragments in one sitting, is performed with instruments introduced into the bladder through the urethra. The instruments required are lithotrites, a mallet, an evacuator, and metal catheters of large size with a large eye. It is indispensable that the urethra be sufficiently large to accommodate the size of the instruments to be passed into the bladder. A narrow meatus may be overcome by meatotomy; and strictures, as a rule, can be dilated.

Preparatory Treatment of Infected Bladder

In many cases, especially with phosphatic concrements, the bladder will be found infected, and, while an existing cystitis cannot be cured so long as the calculus is not removed, an attempt should be made to put the bladder in as good a condition as possible preceding the operation. Irrigations

with antiseptics, and urotropin given internally for a week before the operation, will usually bring

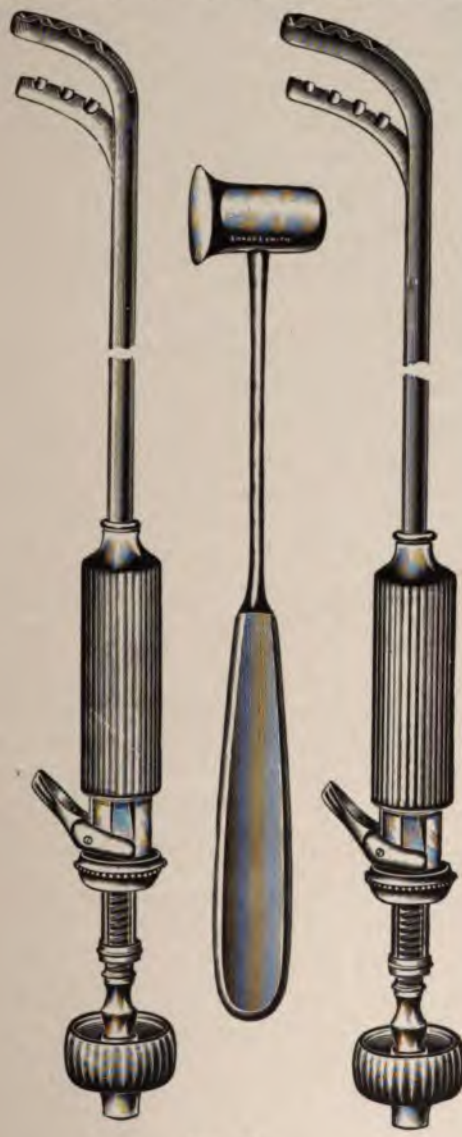


Fig. 95.

this about. All other pre-operative measures are the same as in any major undertaking.

For crushing small stones local anesthesia will **Anesthetics**

usually suffice except when the bladder, for some reason, is extremely irritable and intolerant. Very efficient as a local anesthetic is antipyrin combined with morphine. One hundred cc. (℥iii) of a two per cent. solution is injected into the rectum a half an hour before the operation:

Antipyrin-Morphine by Rectum

℞

Antipyrin,	2.0 (gr. xxx)
Morphin hydrochl.,	0.01 (gr. 1-6)
Aqua destill.,	100.00 (℥iii)

M.

Eucain to Urethra

To anesthetize the urethra 10 cc. (℥iiss) of a one per cent. eucain B. solution may be spread all over its surface by means of an instillator.

Chloroform

In the presence of vesical inflammation or ulceration and for larger stones a general anesthetic is demanded—preferably chloroform. In order to reduce the amount of chloroform to the minimum the author has combined with it the previously mentioned antipyrin solution per rectum.

Technique

The patient should rest on his back with his head somewhat lower than his pelvis, which latter is supported by a stout cushion four inches thick. This cushion should be placed right under the buttocks, but not under the upper part of the pelvis, which in this way is not only elevated but also given an incline backwards. The thighs are separated and the lower legs allowed to hang loosely from the edge of the operating table. After cleansing the genitals and the adjacent integument in the usual manner with soap, sublamin, 1 in 1,000, and alcohol, the bladder is irrigated with a saturated boric solution until the same returns fairly clear; it is then filled with a sufficient quantity of the same fluid to permit free action of the lithotrite. This quantity depends on the size of the stone and the sensitiveness of

Quantity of Fluid to Distend Bladder

Fig. 96

Fig. 97.

the bladder wall; generally speaking, for stones of large dimensions as much as 150 cc. (five ounces) should be injected, for smaller stones 90 cc. (three ounces) to 120 cc. (four ounces) will suffice. However, it is important not to distend the bladder to that point where it would react with more or less violent contractions. By using a hand syringe the limit of permissible tension can be distinctly felt. It is also necessary to use a smaller quantity of the distending fluid in the presence of a small stone in order to create a smaller operating field over which the lithotrite will have to travel.

Avoidance of Forcible Distention

Two lithotrites, size No. 2, should be on hand, one with a short and the other one with a longer beak. The sterilized and well-lubricated instrument is introduced through the urethra like any curved metal sound. Upon arriving in the bladder the beak should be pushed forward in the antero-posterior diameter until it reaches the center of the viscus.

Three Modes of Opening Jaws of Lithotrite

The jaws of the instrument may be opened in three different ways, each one of them depending on the location of the stone. If the latter be located at or near the vesical neck the lithotrite is withdrawn until the convexity of the male part of the beak slightly "hugs" the neck. The female part of the beak is then pushed backwards until it reaches the lowest part of the posterior wall. By the employment of this mode of opening the jaws of the lithotrite every stone or fragment near the vesical neck can be seized with certainty.

The opposite maneuver is to be executed if the stone or the fragments be located near the posterior bladder wall. In this case the beak is slightly pushed against the junction of the trigone and the posterior wall, the female part steadied

and the male part pulled forward towards the vesical neck.

If the stone be situated in the center of the bladder the jaws should be separated in opposite directions to the required distance, but without exerting pressure on the posterior wall or the vesical neck respectively.

Each one of these three maneuvers should be carried out in the antero-posterior diameter.

We possess two methods of seizing the stone: the direct, by which the lithotrite approaches the stone, and the indirect, whereby the stone is "coaxed" into the jaws of the instrument. The second mode of seizing the stone should be reserved for application when the direct method fails.

Direct Seizure

The latter method is very simple if the instrument be properly introduced, placed and opened. Thus, the instrument with its jaws opened is turned to one side and the jaws brought together; if this can be done, the jaws are again opened, turned to the other side and an attempt made to close them there. If this again be possible, indicating the absence of a stone between them, the beak is turned towards the floor of the bladder and the maneuver repeated.

Since stones always settle into the transverse diameter of the bladder, either on the right or left side or in the center, we shall always be able to seize them in one of the three positions provided the shaft of the lithotrite remains in the antero-posterior diameter during all these excursions.

Indirect Seizure

The indirect seizure of the stone is accomplished in the following manner: After placing the lithotrite as in the direct method, the bottom and lower part of the posterior wall are depressed by raising the handle of the instrument above the

Fig. 98.

Fig. 99.

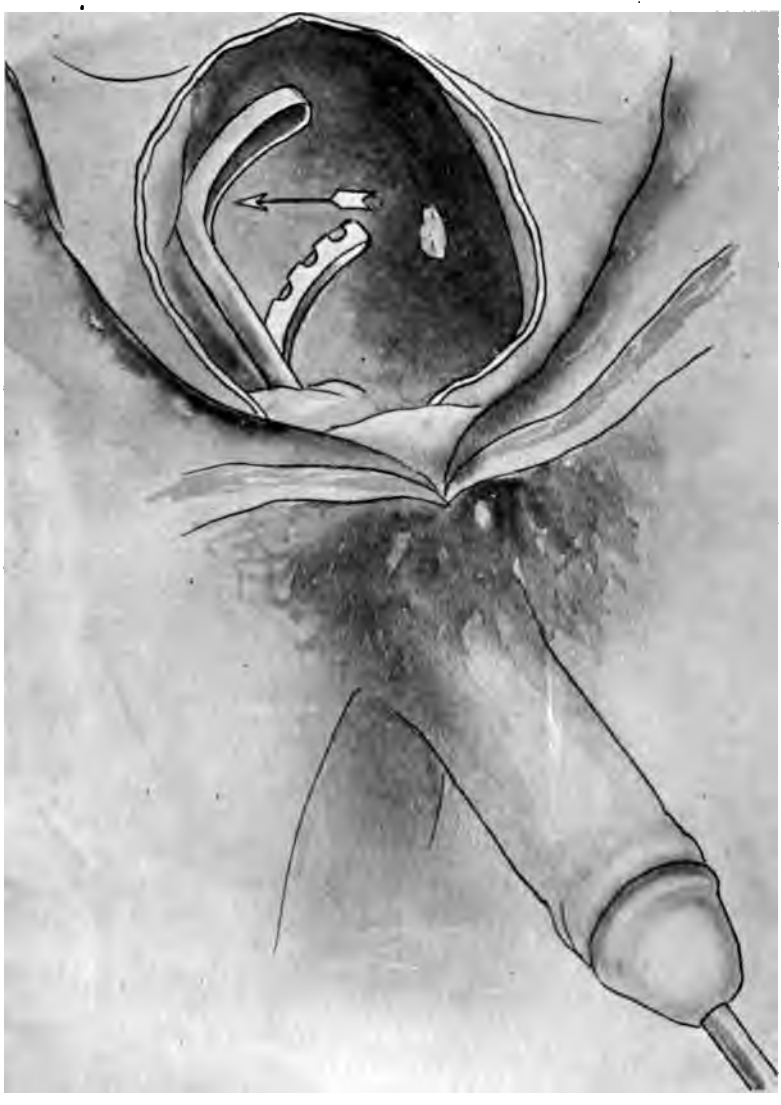


Fig. 100.

Fig. 97.

Evacuation of Fragments

The crushing of the stone being completed, the lithotrite is then removed and the evacuation commenced. To this end I use the so-called "grande lavage" and aspiration.

Grande Lavage

Grande lavage consists in irrigation of the bladder with large quantities of fluid through a large-sized metal catheter with a long beak and two large eyes. The aspiration is performed with an evacuation pump, Bigelow's or Guyon's models being the most serviceable.

The syringe employed for the grande lavage should have a capacity of 150 cc. (five ounces) and a point with a wide opening permitting the free flow of large quantities of fluid. The piston must glide very easily in the barrel. The solution—boric acid—must be forcibly thrown into the bladder in order to create a whirl which lifts the fragments up and at the same time stimulates the contractions of the bladder wall, which at this stage are of material assistance in the evacuation. The lavage may be repeated in this manner until the fluid returns clear, and free from fragments. In order to render the evacuation as complete as possible it is necessary to change the position of the beak in the bladder in the same way as previously indicated for the position of the lithotrite. Especially important are the regions near the vesical neck and the angle formed by the trigone and the posterior wall.

Aspiration

Every grande lavage should be followed by aspiration, whereby larger fragments may be effectively removed. The aspirator, filled with boric acid solution, is attached to the same catheter which was used for the lavage, and the proximal end of the latter then depressed so that the aspirator top does not rise above the level of the bladder. This position of the aspirator is important in order to avoid unnecessary and disturbing

Position of Aspirator

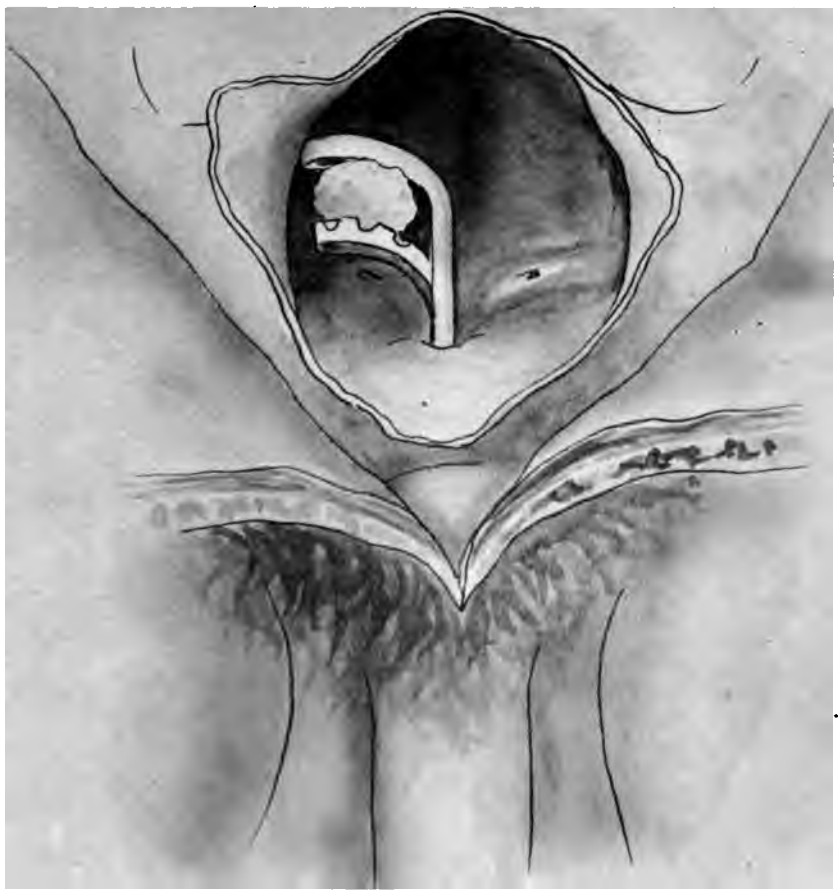


Fig. 101.

tension of the bladder wall. It is further important to make all excursions with the catheter in

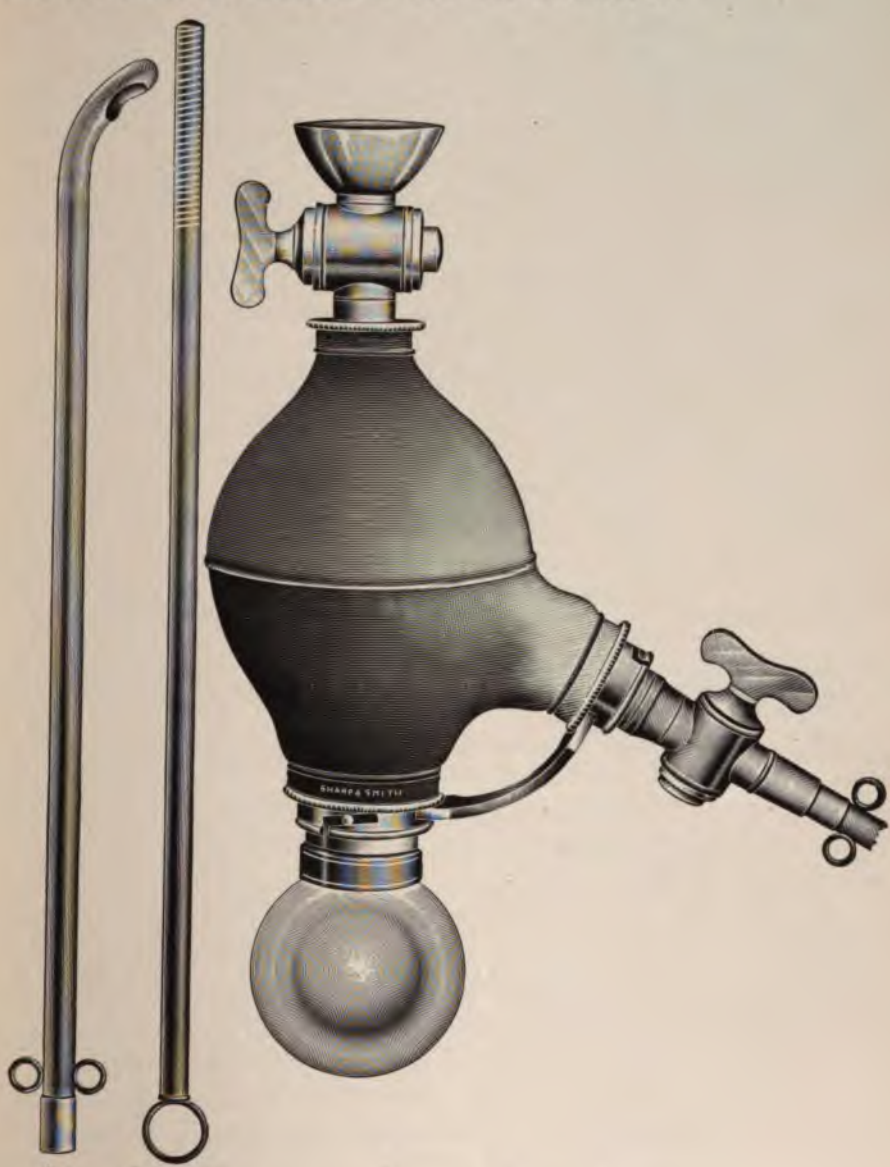


Fig. 102. a. Aspirator; b. catheter; c. catheter stylet.

the axis of the antero-posterior diameter and in the same manner as when attempting to seize the

stone with the lithotrite. While turning the catheter around its axis the aspirator must remain in its upright position. The fluid is propelled by compressing the aspirator-bag at very short intervals. These may be lengthened to fifteen and even thirty seconds, when the bulk of the fragments has been removed, in order to allow the remaining smaller particles time to settle down to the bottom of the bladder. To remove the last of the fragments the formation of an artificial depression, as indicated above in describing the crushing operation, will be useful.

It is well to know that the fragments are always to be found in the region where the crushing took place.

Cystoscopic Revision

A cystoscopic examination should follow to determine if any fragments have been left behind. Some surgeons, however, favor palpation with the stone-searcher and defer the cystoscopic examination to a later day, claiming that a clear view of the bladder cannot be obtained immediately after the crushing and evacuation. The author has never experienced such difficulty and does not think there should be any, provided the operation is performed skillfully, and the bladder thoroughly irrigated preceding the inspection. Even if skillfully done, litholapaxy is sometimes associated with bleeding, which is due either to the tension of the inflamed bladder wall or to the unavoidable traumatism dependent upon an enlarged prostate. But such hemorrhages should not be allowed to interfere with a cystoscopic inspection, as they can easily be controlled by the addition of a few drops of adrenalin solution to the irrigation fluid.

If fragments are left behind, the operation loses its chief characteristic—litholapaxy, and its

chief advantage—to free the bladder from the cause of its troublesome symptoms.

The operation may be concluded by an injection of a 1:1,000 silver nitrate solution, followed by an instillation with iodoform-guaiacol suspension in the presence of ammoniacal cystitis or ulcerations.

Rest in Bed

The patient should be kept in bed for two to three days.

Post-operative Treatment of Cystitis

Very naturally the cystitis should be attended to after the operation or else vesical calculus will soon form again. In the milder degrees the treatment outlined in the section on *Cystitis* will be sufficient, but in the presence of severe vesical inflammation or ulceration continuous catheterization for a few days or even weeks may be required. The catheter, however, must be removed at least for several hours, after two days, and the urethra irrigated because of the unavoidable traumatic urethritis caused by the presence of a foreign body.

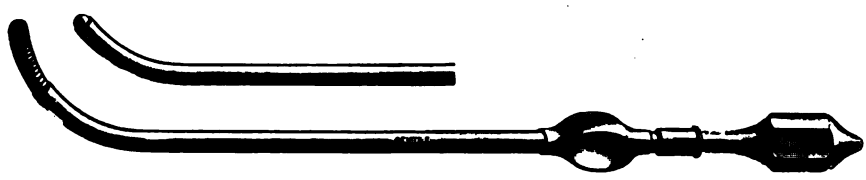


Fig. 103. Catheter with flexible stylet for grande lavage.

Indications for Litholapaxy

Litholapaxy is indicated in free stones of small or medium size. The density of the calculus may be considered immaterial so long as the elasticity and strength of the lithotrite remain perfect.

Limit in Hard Stones

However, hard stones (uric acid—oxalate of lime) of a diameter of over five centimeters (two inches) as a rule are not amenable to the crushing operation and should be removed by lithotomy.

Limit in Phosphatic Concretions

Phosphatic concretions of a diameter of seven and even nine centimeters may be crushed under

favorable circumstances, but oftentimes the local conditions in the bladder and prostate prevent this. Fig. 104 illustrates such a phosphate stone, which ordinarily could have been crushed, but on

Fig. 104. Author's case. Phosphatic concrement; actual size; weight 150 cc.

account of being partly retained in a diverticulum and a complicating prostatic hypertrophy had to be removed suprapubically.

Fig. 105 shows the actual amount of fragments and débris of a uric acid stone removed by lith-

Fig. 105. Author's case.

olapaxy. This stone measured in its long diameter seven centimeters, but in its short one only three centimeters, and it was possible to grasp the concrement by its short axis with the lithotriptor.

Multiple Stones

The operation is not indicated when several stones are present. It may be rendered very difficult, even impossible, when the stone is arrested between the prostate and bladder wall, or retained in a diverticulum.

Vesical Diverticulum

A large prostate gland does not seriously interfere with the operation, as the stone, if necessary, may be seized and lifted out of a retroprostatic pouch by turning the beak 180 degrees around its axis from its first position. But the evacuation of fragments may be rendered difficult by the pouch, or other irregularities in the shape of the bladder which are commonly found in this disorder.

Prostate Hypertrophy

One or more stones, the size of which must be smaller than the diameter of the large evacuation catheter, may readily be removed by aspiration. The frontispiece illustrates such a case in which I aspirated eleven stones at one sitting lasting but a few minutes.

Litholapaxy in the Female Bladder

Litholapaxy in the female bladder is somewhat difficult, for anatomical reasons, such as lack of support to the lithotrite (as rendered by the prostatic urethra), the greater distensibility of the posterior wall, and the irregularities in contour. The smaller calculi obviously may be easily extracted through the previously dilated urethra.

Lithotomy

Lithotomy. Perineal lithotomy is seldom performed nowadays. Stones which are so large or so situated as not to be amenable to litholapaxy are also too large or too difficult to be reached by the perineal route.

Perineal Route

The technique is the same as in perineal urethrotomy, except that the incision is carried way up into the prostatic urethra to gain more room.

Suprapubic Route

Suprapubic lithotomy is generally preferable when a cutting operation is required. The preoperative preparation is the same as for litholа-

paxy. The bladder should be distended with 300 cc. (ʒx) of air by means of a soft rubber catheter and a hand syringe; the catheter then is withdrawn and the air prevented from escaping by constricting the penis with an elastic band or Nélaton catheter.

Technique

The patient should be placed in the Trendelenburg position which forces the intestines well away from the anterior bladder wall, which should be opened in the manner described under the head of *Prostatectomy,* and the constricting band around the penis removed. The stone may be at once seized with a scoop or forceps and removed.

Closure of Bladder

Unless infection exists, or other lesions of the bladder forbid, the viscus is closed by two rows of Lembert sutures, the first row penetrating through all coats except the mucosa, the second row only through the serosa. Four hundred cc. (ʒxiv) of an antiseptic solution are now injected through a catheter to test the suture line. If leaking points are discovered they are secured by a few catgut sutures. The skin and muscle layers are then closed, except at the lower angle where a small rubber drainage tube or strip of iodoform gauze is placed in the prevesical space for a few days.

Testing of Suture Line

If the patient does not urinate spontaneously he should be catheterized every four to six hours, but usually this is not necessary, and in two weeks he may be allowed to leave his bed.

Old individuals should be permitted to sit up much sooner since a prolonged recumbent posture enhances the danger of hypostatic pneumonia in advanced age.

Infected Bladder Drained

If the bladder is found infected it is not closed completely, a small space in the upper angle being left open through which a drainage tube may be passed.

The bladder should be anchored to the aponeurosis and muscles on either side by two or three silkworm-gut sutures, whereby urine infiltration is avoided. These sutures may be removed after four days. The rest of the wound is treated as above.

Removal of Drainage-Tube

The drainage tube may be removed on the tenth day; the wound usually closes at the end of the third week.

Lithotomy in the Female Bladder

Lithotomy in the female bladder may be performed suprapubically or through the vagina. The latter route is usually given preference for cosmetic reasons—viz., absence of a visible scar, and because of the ready accessibility of the bladder.

The preparation of the patient is the same as for suprapubic cystotomy, with the addition of a thorough cleansing of the vagina, as customary for other vaginal operations.

Technique

The patient is then placed in the dorsal position; the perineum retracted with a speculum; a grooved vesical director introduced into the bladder; the anterior wall depressed with it in the median line and the vesico-vaginal septum incised along its groove into the bladder. Care must be taken to make the incision exactly in the median line in order not to injure the vesical portion of the ureter. After removal of the stone the wound should be closed with a two-row catgut suture, in which the vesical musoca should not be included.

If the bladder is found badly infected the wound should be kept open for drainage, which is accomplished by drawing the vesical mucosa out through the wound with a tissue forceps and suturing it to the vaginal mucosa. The resulting fistula may be closed at a suitable time in the usual manner.

Indications for Lithotomy

Lithotomy should be reserved for all those calculi which are not amenable to litholapaxy, although most of them can be removed by the latter procedure. It is rather singular that here in America where this method, through Bigelow's ingeniousness, originated, overwhelming preference is still given to the cutting (chiefly suprapubic) operation.

ENURESIS.

Specifics Useless

The current literature on this subject is full of "specifics" for this condition, for which there is really no specific, unless the cause of it be fully recognized and is removable. A multitude of essential or functional lesions are known to be responsible for the trouble, yet common to all of them is the peculiar disparity between the action of the sphincter and the detrusor vesicæ. Therapeutic success, therefore, depends on the possibility of locating the immediate or the predisposing causes, and removing them.

Causative Treatment

A very frequent finding is hyperesthesia of the prostatic urethra in boys, and of the vesical neck in girls, which conditions are easily demonstrated by palpation with a small-sized elastic bougie. Again, in other cases, hyperesthesia is absent, but there is a distinct under-development of the prostate gland, and, in girls, of the circular fibres. A metal bougie introduced into the bladder finds no resistance at the vesical neck in such a case.

Hereditary Predisposition

Many times children are found to be neurotic, and frequently an hereditary predisposition can be ascertained. In the management of these cases we must, therefore, consider the general treatment, together with local procedures.

Phimosis, balanitis, strictures and renal diseases are treated accordingly.

Medicinal Treatment

Abnormal conditions of the urine—phosphaturia and oxaluria—should be corrected by a suit-

able diet and the use of such remedies as check their over-production and precipitation. In phosphaturia, we may give internally:

℞

Acid phosphor. (or hydrochlor. dil.), 3.0 (mxlv)
Aqua. dest.
Syr. simp., āā 30.0 (℥i)
M.
Sig. One to two teaspoonfuls in water after meals.

℞

Acid lactic, 3.0 (m. xlv)
Aqua dest., 100.00 (℥iii)
Aquae menth. pip., 30.0 (℥i)
M.
Sig. Tablespoonful after meals.

The diet should consist of meats, eggs, cheese, cereals and legumes. Potatoes, fresh vegetables, vegetable acid salts and fresh fruits are not permissible.

Phosphaturia a Secretory Neurosis

It should not be forgotten that phosphaturia is frequently due to a secretory neurosis of the stomach, and a delayed but not diminished secretion of hydrochloric acid. In these cases proper attention to the neurosis is required, rather than the giving of mineral acids.

Oxaluria an Alimentary Disorder

Oxaluria is mostly of alimentary origin, or indicates some oxidative perversion leading to incomplete metabolism. Internally, magnesium sulphate one gramme (15 grains) in a copious draught of water may be given three times a day, or nitric acid, two to three drops in a half glassful of water, before meals. Spinach, cabbage, rhubarb, tomatoes, milk, eggs, tea and cocoa should be excluded from the diet.

Diet

If hyperacidity of the urine is the cause of enuresis, a half teaspoonful of bicarbonate of

soda, in water taken before retiring, gives satisfaction.

Fissure of the rectum or oxyuris are sometimes responsible for enuresis. Fissures are best treated by dilatation of the rectal sphincter and application of the thermo-cautery.

Occasionally enuresis for a long time is the only symptom of vesical calculus, and ceases with its removal.

Local Treatment

If there is marked irritation in the urethra near the vesical neck, without any other determinable cause, a few instillations with a one per cent. nitrate of silver solution are helpful; just as efficient is a metal bougie used for five minutes every other day, or the faradic current applied with one electrode in the rectum and the other over the symphysis.

Instillations

Metal Sound

Electricity

Sub-development of the prostate and of the muscular fibres of the urethra should be treated by rectal massage aided by a metal sound placed in the urethra. Vibratory stimulation is also beneficial.

Massage

Vibration

Vulvo-vaginitis is a not infrequent, yet often overlooked, cause of enuresis in young girls, and readily yields to vaginal injections with antiseptic solutions like protargol; or silver nitrate, 1 in 4,000; argyrol, 1 in 500; permanganate of potash, 1 in 2,000; and the subsequent introduction of vaginal bougies of ichthyol. It should be remembered that masturbation in both sexes may produce enuresis. The method of elevating the foot of the bed thirty degrees, so that the child sleeps with its head downward, also is of some value.

Elevation of Pelvis

After having treated many cases of enuresis, and after reviewing the results obtained by the various local methods, one cannot help receiving the impression that frequently the mental effect produced by the divers manipulations deserves

quite as much credit for the successful result as anything else.

Epidural injections

In cases of distinct spinal origin epidural injections are of marked benefit. The technique is simple and can be easily learned by every physician familiar with the anatomy of the os sacrum and the epidural space. A two per cent. salt solution is injected into the sacral canal, which is reached through the sacral foramen. The formula for the solution is:

℞

Sodii chlor.,	0.2 (gr. iiss)
Aqua dest. sterilis,	100.0 (℥iii)
Aqua carbol., 5 per cent.,	gtts. ii

The addition of a small quantity of carbolic acid makes the solution more stable.

Technique

A Pravaz or Record syringe holding 10 cc. (3iiss) is employed with platinum-iridium needles of 6 cm. length and 1 mm. circumference.

The child should be placed in the Sims position with legs flexed and the thighs tightly drawn towards the abdomen, whereby the obturator membrane of the sacral canal is tensely stretched.

The sacral region and the skin for quite a distance from the operating field is thoroughly cleansed as before any other operation, and then the entrance in the sacral canal located by means of certain "landmarks" which are: The two last (fifth) posterior inferior osseous tubercles and the last spinous processes of the os sacrum. By three lines connecting these three points a triangle is formed the base of which is between the two ossicles and the apex at the spinous process. Just below the latter is the entrance into the sacral canal. This is found in the following manner: With the patient in the Sims position, the index and middle fingers of the left hand are passed down over the spinous processes until the last one

(fifth) is felt. The fingers are now slightly separated and in passing down a very short distance

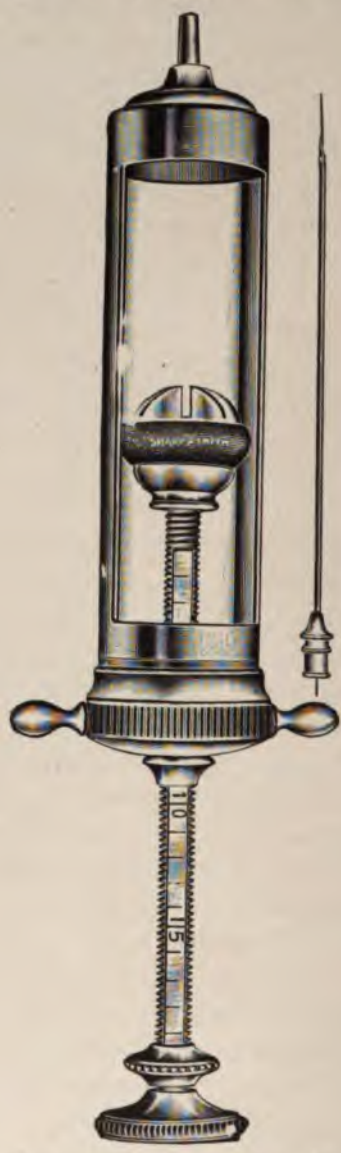


Fig. 106. Actual size of syringe and needle for epidural injections.

(not more than one centimeter) the two osseous tubercles are palpated. Between these and slight-

ly upwards the canal may be entered with the needle. In very fleshy patients such landmarks are not distinct and we use in these cases the fold between the nates as a guide. The canal will be

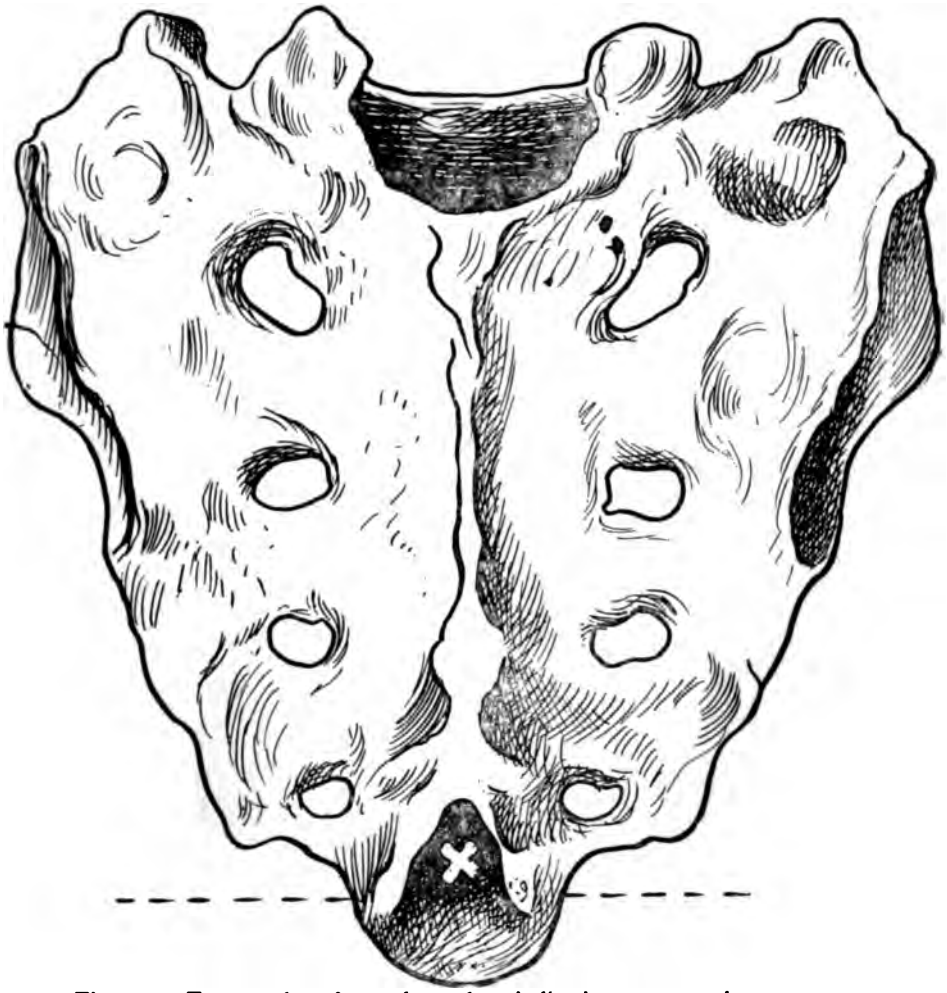


Fig. 107. Topography of sacral canal, x indicating entrance in epidural canal.

found at a point about two centimeters upwards and one to two centimeters to the right of the middle line.

The needle is held firmly between thumb, index and middle fingers of the right hand. The index

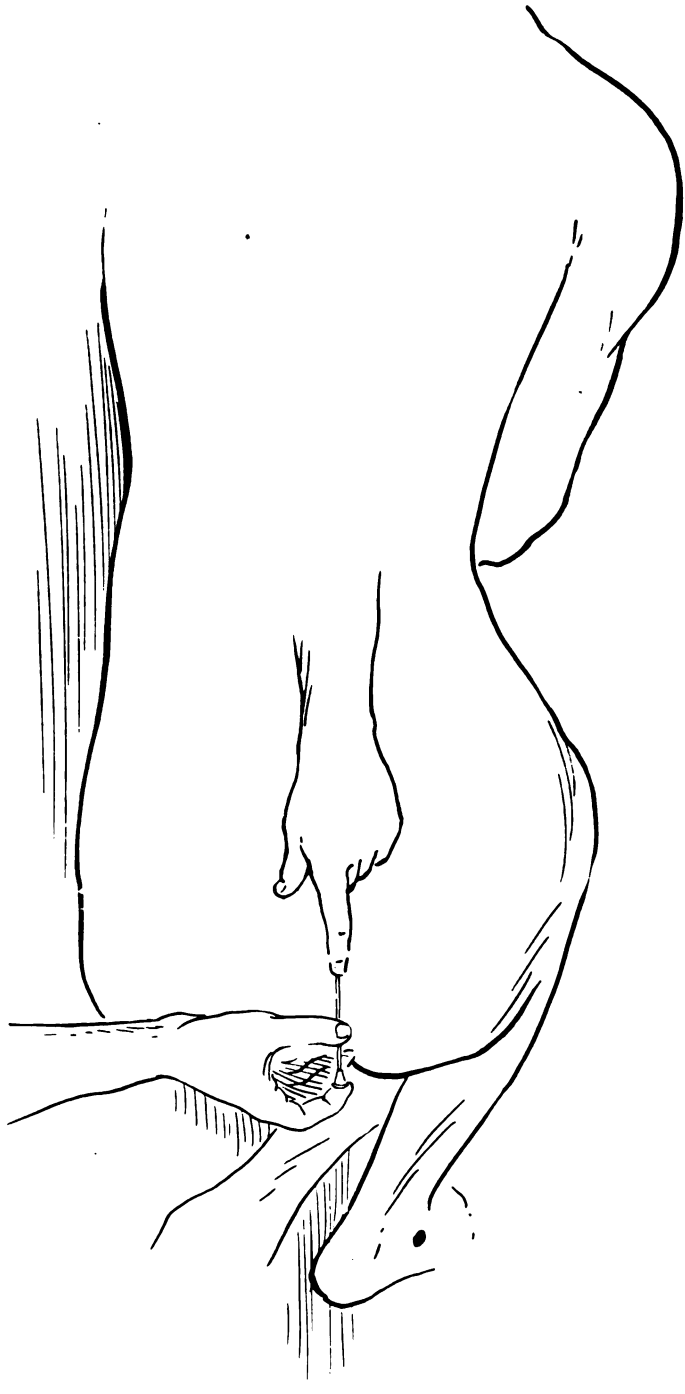


Fig. 108. Position of patient for epidural injection.

finger pressed against the apex of the sacral triangle renders the skin tense. The needle held at an angle of twenty degrees to the horizontal is plunged through the tissues until a distinct sensation similar to perforating a tense drumhead is

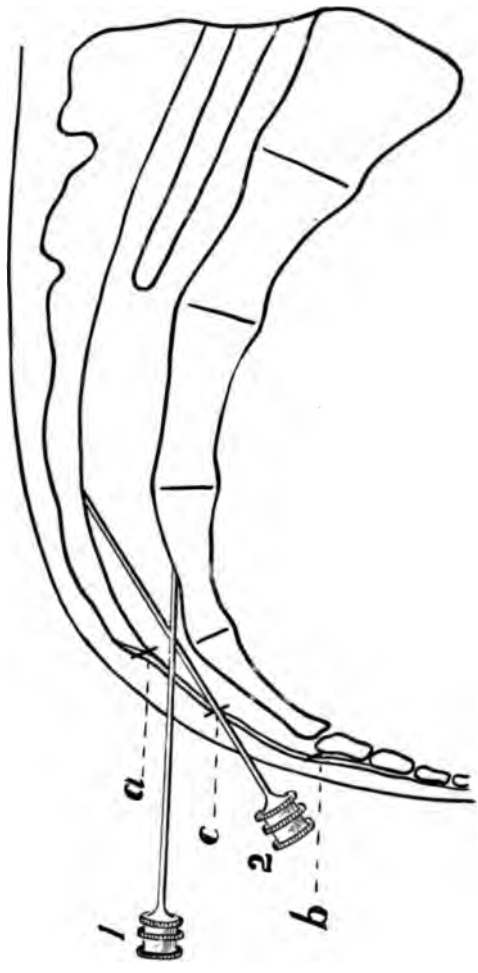


Fig. 109. Diagram showing wrong direction of needle.

felt, which indicates that the point of the needle has passed through the obturator membrane and entered the sacral canal. The proximal end of the needle is now depressed towards the sacrum and by maintaining its position in the middle line

pushed forward into the canal to the length of three to four cm., according to the age of the child.

If pushed up higher than four cm. the subarachnoidal space might be injured; if pushed up less

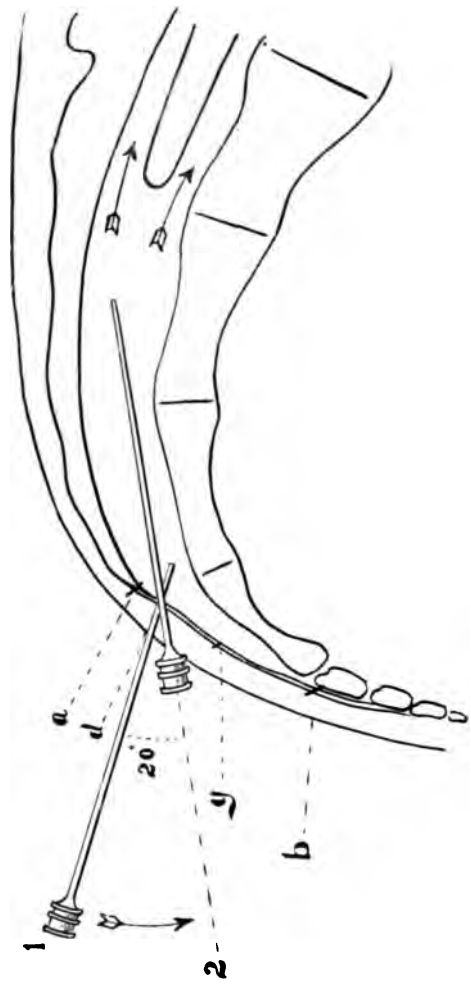


Fig. 110. Diagram showing correct positions of needle. First position to penetrate membrane. Second position to proceed in canal after penetration of membrane.

Precautions Required

than three cm. the fluid would fail to enter the epidural space. If blood flows from the needle, no injection should be then made. If the needle

is freely movable sideways it is not in the epidural canal, and another attempt must be made to enter it. If the correct position of the needle is assured, its cap is held with the left thumb and index finger, the syringe attached to the cap, and the liquid slowly injected into the sacral canal. Not more than three to five cc. (3i) of the solution should be injected at the first treatment. The needle is then withdrawn and the region of the puncture is covered with a piece of zinc oxide plaster, or with collodion.

Quantity to be Injected

The injection may be repeated in from two to five day intervals, and the quantity, if necessary, increased to ten cc. (3iiss).

The effect is sometimes apparent after the first injection; sometimes a dozen or more are required before any result manifests itself. (It is hardly necessary to say that spina bifida is an absolute contraindication for this method.)

The benefit derived from this method is, in the author's opinion, due to the direct mechanical effect of the volume of fluid on the spinal centers.

Epilepsy an Etiological Factor in Enuresis

In very stubborn cases of enuresis a form of epilepsy should be thought of which French neurologists designate "petit mal." It is a mild epileptic attack oftentimes appearing during the hours of sleep and lasting but a very short time.

During this attack the bladder may be emptied involuntarily. Nothing can be expected from the epidural method in such cases.

Urine dribbling as observed in detrusor paresis strictures and prostatic hypertrophy should not be diagnosed as enuresis or incontinence. The term incontinence indicates the inability of the bladder to hold the normal or even a small quantity of urine, while in the disorders mentioned the bladder holds too much of it, and the dribbling constitutes an overflow of urine. The passage of a

catheter into the bladder will assist in avoiding this diagnostic error.

NEUROSES OF THE BLADDER.

The term neurosis of the bladder is used rather lavishly, indeed more so than is consistent with our present knowledge of the disorders of the urogenital tract and with the facilities afforded by present improved methods of diagnosis. It should be the last condition thought of when an extended examination has failed to demonstrate a definite cause for the troublesome symptoms.

Conditions Simulating Neurosis

Vesical tenesmus with a perfectly clear urine precedes the more advanced symptoms of tuberculosis of the urogenital tract, especially of the prostate and kidney. If in such a case repeated bacteriological examinations or an inoculation test are made, the patient could be spared much suffering, the prognosis of the case would be rendered more favorable, and the physician's prestige raised by a correct diagnosis.

Under similar symptoms a sound is usually passed for exploratory purposes, which may be followed by an improvement of the vesical distress for awhile. When the trouble returns we pronounce it a neurosis, when by means of a large-sized, probe-pointed bougie, or through the urethroscope, we could easily have found the evidence of a stricture of large caliber.

In other instances, urethral calculus, rectal fissure, pathologic conditions in the uterus and the female adnexa, cystocele, a loose kidney, or syphilis, are responsible for the vesical symptoms. Very readily are we deceived when such symptoms are complained of by neurotic patients, be it that the neurosis exists as an independent lesion, or as the result of the vesical disorder. Just the fact that apparently normal urine is frequently found—at least at some stage—in these conditions

should call for the employment of all of our diagnostic means and acumen, such as is rendered by cystoscopy, urethroscopy, radiography, the microscope, and the laboratory tests.

However, there is such a condition as neurosis of the bladder, and it appears as irritability of the motor nerves, as irritability of the sensory nerves, and as paresis or as paralysis.

Causative Treatment

Most cases of this kind have to be treated according to the principles accepted for nervous disorders elsewhere, but to a certain extent local applications will be required. In some cases of sphincter spasm, an instillation of a few drops of a two per cent. cocain solution, or a catheter tied in the bladder for several days, will be serviceable. In others, the larger sizes of metal sounds are useful. In the hysterical type of urine retention, dilatation above the normal size of the urethra, especially of the vesical neck, is very efficient. One should remember that the normal dilatability of the female urethra is from forty to forty-five mm.

Cocain in Sphincter Spasm

Dilatation

Faradic Current

Others are benefited by a strong faradic current applied to the internal sphincter, either through the urethra, the vagina, or the rectum. The other electrode may be placed against the perineum, or above the symphysis. Immediate relief may also be obtained by the instillation of a few drops of a three per cent. silver nitrate solution in the vesical neck, after the bladder has been emptied.

Silver Nitrate

Persistent urine retention requires symptomatic, aseptic catheterization, and here the same rules must be observed as in retention due to mechanical causes.

For the incontinence due to impairment of the tonus of the vesical sphincter two surgical methods occasionally give satisfactory results—viz., the injection of paraffin close to and outside the

Paraffin Injections

vesical neck in women, and the injection of normal salt solution into the epidural canal, which latter is applicable to both sexes.

Epidural Injections

The technique of Catheline's epidural injection is described in the section on the treatment of *Enuresis.*

Von Frisch's Method

Paraffin or vaseline injections are made through the vaginal wall in different places around the vesical sphincter. In order to avoid injuring the latter with the tip of the injection needle, and also to properly deposit the mass, the index finger, or a metal sound, is inserted into the urethra. Accidents due to injecting into a vein can be avoided by watching the cap of the needle after the latter is placed into the tissues. If blood escapes from the needle its position must be changed before the syringe is attached and the mass injected. Not more than one-half to one cubic centimeter should be used for this purpose.

CHAPTER VIII.

DISEASES OF THE PROSTATE.

PROSTATIC CALCULUS.

Expectant Treatment

The treatment should be expectant, unless persistent pain, urine retention, excessive bleeding, or an abscess pointing towards the rectum calls for surgical relief. Frequently these concrements are spontaneously expelled into the urethra, from which they may be washed out by the stream of urine; or else they drop into the bladder and thence may be removed by an evacuator. If operation is decided upon, the safe route should be followed as in prostatic abscess—viz., perineal exposure of the prostate, incision of the rectal aspect and removal of the stone with suitable instruments (forceps, scoop, curette).

Surgical Relief

MALIGNANT TUMORS.

Sarcoma

The results of surgical intervention for the removal of neoplasms of the prostate have been so far very disappointing. Sarcoma, most frequently observed in children, grows without any symptoms (hematuria, pain) which would likely draw attention, until a sudden retention of urine occurs. At this stage the tumor will have attained such dimensions that it can be seen bulging at the perineum and may be palpated through the rectum. Indeed in a sudden urine retention in children one should first and at once consider the possibility of an obstruction caused by sarcoma.

Carcinoma

The symptoms of carcinoma of the prostate resemble those of prostate hypertrophy and the circumstance that it occurs most frequently in men

over fifty years of age explains why the diagnosis is usually not made at a time when radical surgical precedures might possibly be successful. However, there are two pretty constant symptoms found in the early stage which are pathognomonic. These are the pain associated with micturition and the neuralgia along the plexus sacralis and lumbalis, radiating to the thighs, the perineum and the sacrum.

Should this neuralgic pain be observed in a man above fifty years of age, who presents symptoms of prostatic hypertrophy associated with hematuria, the diagnosis of carcinoma of the prostate is usually justified.

Palliative Treatment

In many cases of neoplasms of the prostate, as we see them, we generally have to be satisfied with a palliative treatment, consisting in the application of heat through the rectophor, the liberal dispensation of narcotics for the pain and tonics to fortify the patient's physical resources.

Heat, Opiates

Catheterization

The urine retention should be relieved by systematic and strictly aseptic catheterization, as indicated in the section on *Prostatic Hypertrophy*. Only soft rubber or silkweb catheters are permissible in order to avoid hemorrhages, which sometimes assume alarming proportions if metal instruments are employed. Cystitis, frequently an early complication of the disease, may be treated accordingly. However, catheterization soon becomes extremely painful, difficult and sanguinolent as the neoplasm grows into the urethra and towards the bladder, and suprapubic puncture has to be performed, and a permanent fistula established, in the manner described in the previous chapter. It is better to establish such a fistula by suprapubic cystostomy if concrements are to be removed from the bladder, or curettage and cauterization of the exulcerated vesical part of the gland is desired.

Suprapubic Fistula

Radical Operation

Extirpation of the prostate is indicated in those cases in which the neoplasm is still confined within the prostate capsule, and may then be performed by the same technique as practised for prostatic hypertrophy. Such steps should not be attempted when the evidence points to involvement of the lymph glands of the pelvis (edema of the legs, scrotum, perineum, penis).

ECHINOCOCCUS OF THE PROSTATE.

This requires surgical treatment, which should not consist in puncture, but in extirpation of the cyst by a prerectal incision.

CHRONIC PROSTATITIS.

The far-reaching consequences of chronic prostatitis; its local effect on the structures of the gland; the subsequent lesions in the bladder and kidney; the long train of local and reflex disturbances; and the functional derangements terminating in sexual neurasthenia require our full attention.

Prophylaxis

In the treatment of this trouble we should not only concentrate our efforts to alleviate and cure the consequences, but also endeavor to prevent them. Since gonorrhea is the chief cause of chronic prostatitis, it should be the chief aim to prevent, by proper treatment, the extension of the infection to the posterior urethra, and, indeed, in the hands of those who have made themselves familiar with the efficient management of acute gonorrhea, prostatitis, like other complications, should be a rare occurrence.

Aseptic Type

The treatment of the aseptic form of prostatitis does not present any difficulties. If sexual excess, coitus interruptus, or masturbation, causing frequent and prolonged congestion of the prostate, are discontinued the trouble soon disappears with, or even without, any local therapy. If stricture

or cystitis is the cause a suitable treatment of these conditions will cure the prostatitis. It is different with the management of the other forms following the catarrhal, the follicular or the parenchymatous prostatitis of gonorrheal origin, each one of which may produce structural changes in such manner that subsequent symptoms are either so slight as to remain unnoticed for a long while, or so indistinct as to be misinterpreted. Vesical symptoms, such as frequent or painful urination and cloudy urine, predominate so much at times that the real issue may be utterly neglected in the treatment, or the presence of a few shreds in the clear urine leads many to consider the case too mild to deserve attention. And yet the same bad results follow these mild cases as in others in which the urine shows an abundance of pus and in which the symptoms of prostatitis are very pronounced. It is self-evident that the posterior urethritis and gonorrheal infection, which are frequently found associated with chronic prostatitis, require suitable attention.

Gonorrheal Prostatitis

Local Teatment

The treatment of chronic prostatitis is purely local. It consists in the application of heat to the gland, together with systematic massage. Heat may be applied through the urethra or through the rectum. For the application through the urethra the psychrophor, a hollow bougie which allows hot water to circulate through it, is employed. The rectal route, however, is preferable for several reasons, and the application of heat therein may best be accomplished by means of a pear-shaped thermophor (Arzberger's rectophor or any of its modifications). Heat should be applied in this way for fifteen to thirty minutes, once or twice a day.

Heat and Massage

But massage is the most efficient and satisfactory method we possess for the treatment of

chronic prostatitis. Massage of the prostate will empty the gland of pus that has accumulated, and will relieve the congestion if no pus has formed. By stimulating the lymphatics absorption is promoted and the muscle tonus in the gland improved.

Technique of Massage

Technique of prostate massage. Inject 150 cc. (five ounces) of a mild antiseptic solution into the empty bladder and place the patient in the knee-chest posture, or in the Sims position, with the knees drawn up closely to the abdomen, or on his back with the knees flexed, the buttocks resting on a cushion or, as Valentine advises, on the patient's own fists. The standing posture is not practical for several reasons, chiefly because the perineum is not sufficiently relaxed, a disadvantage to the physician particularly apparent in a fleshy patient; and secondly because of the faintness observed in many persons in the early treatments, a faintness due to the mechanical irritation of the lowest part of the rectum causing lowering of the blood pressure. A piece of absorbent gauze or cotton is placed at the exit of the urethra to prevent any secretion that might escape during the massage from soiling the patient's body or the table upon which he is resting. The index finger, covered with a "rubber-cot" and the latter well lubricated with vaseline, is inserted into the rectum, care being taken not to drag along the circumanal hairs. To avoid unnecessary pain the finger should press against the anterior rectal aspect during its introduction until it arrives at the upper (vesical) margin of the prostate. From there a systematic examination of the seminal vesicles, ampullæ and the prostate should be conducted, the result of which will determine the character of the subsequent massage. Generally speaking, the massage should be performed very

Position

gently in the earlier treatments, especially when the gland happens to be very sensitive upon palpation and the introduction of a small-sized sound into the deep urethra has caused severe pain. It is hardly necessary to say that the soft part—cushion—of the index finger should be used and not lateral part of the finger, nor the extreme end of it.

Direction of Strokes

The strokes should be commenced at the apex of the gland and gradually extended thence over its whole surface until the base is reached. The strokes should be directed downward and from the extreme right and left of the gland towards the center, but never from the apex upwards to the base. Rotary motions over each lobe may also be used.

Duration of Massage

No hard and fast rules can be laid down regarding the force to be employed, the length of a single massage and the intervals of time between each treatment.

Intervals

As to the first point I would advise to be guided by the patient's sensitiveness and the golden rule never to render any manipulation in the urinary tract so painful as to scare the patient away from the table and the office; or produce an acute condition out of a chronic one. Regarding the second point, one to two minutes for the earlier treatments, and from three to four minutes, as improvement progresses, are sufficient. An interval of two to four days may elapse between each treatment.

Massage Over Metal Sound

Indurations and solid infiltrations which do not readily yield to this treatment sometimes improve very much by massaging the gland over a metal sound, preferably one with a Béniqué curve, introduced into the bladder.

After concluding the massage the anus and adjacent parts should be cleaned from the lubri-

cant and the patient ordered to pass the antiseptic solution from his bladder into a glass urinal. From the density of the cloudiness of the fluid, and the quantity and form of shreds and débris suspended therein, we draw our conclusions regarding the improvement of the condition from one treatment to the other. Every massage should also be followed by an injection or instillation of an antiseptic or astringent solution, as the case may require.

Local Applications Following Massage

In catarrhal conditions 150 cc. (five ounces) of a one-quarter per cent. solution of sulphate of zinc, alum, and carbolic acid (see formula in portion under *Cystitis*) is serviceable. If there is infection present the antiseptics indicated in the treatment of chronic posterior urethritis should be used.

Prostatic massage is not advisable in acute prostatitis or tuberculosis of the gland, and should be at once discontinued if a chronic process shows evidence of acute exacerbation.

Contraindications

Local remedies such as medicated rectal bougies (ichthyol, iodine and mercury) are still in use, but very little may be expected from such treatment, especially in a chronic case.

Rectal Medication

Various instruments have been devised for rectal massage but with little success, since it is impossible to differentiate with them the diseased parts of the gland or regulate the pressure as well and as safely as can be accomplished by direct touch.

The general condition of the patient should not be neglected. A suitable diet, exercise, regular evacuation of the bowels, a tonic, and a cool Sitz bath will materially assist the local treatment.

General Treatment

In extreme cases of destruction of much parenchyma, which has terminated in the formation of one or more cavities in the gland, it is rational to

remove all the flabby tissue by curettage through a perineal incision.

Frequency of Relapse

The patient should be informed of the extreme chronicity of the disease, of its inclination to relapse and the necessity of repeating the treatments.

NEUROSIS OF THE PROSTATE.

Etiology

In the treatment of this condition we must consider the etiology as well as the symptomatology. In the majority of cases the neurosis is traceable to a preceding gonorrheal prostatitis; others are due to excessive masturbation; and again others, in neuropathic individuals, to overwork. Cases in which inflammatory symptoms are still present may be excluded.

Types of the Disorder

The disturbance appears as a sensory, motor, or secretory neurosis, no one such class of symptoms prevailing alone, however, but rather will there be found variations reflecting two or more groups in the same individual. The symptom-complex has oftentimes such a striking resemblance to essential lesions in the urogenital tract that a very careful study and examination is required lest one be misled into a wrong diagnosis, and a treatment therefore be instituted which would prove harmful and aggravating to the real trouble.

Diagnostic Points

The disproportion between the insignificant evident lesions and the subjective symptoms should be of assistance in the diagnosis. We find, for instance, on palpation, an apparently normal prostate which is extremely sensitive to touch. The patient strains and calls the abdominal muscles into action before he starts to urinate, but within a few seconds he will be passing his water in a good stream, and a large-sized bougie can be introduced into the bladder without any difficulty. The endoscopic inspection of the deep urethra

shows a slightly congested mucosa, or a few hypertrophic folds, but when the smallest bougie a boulé passes over it a paroxysm of pain, and even syncope, is produced.

Cystospasm, compelling the patient to urinate every little while, would indicate a vesical ulcer or a contracted bladder, but it is only complained of as a day symptom and does not bother at all during the night.

Massage of the prostate furnishes a more or less copious milky fluid, but upon closer examination it proves to be a normal prostatic secretion.

Though not within the scope of this book, yet I believe it expedient to emphasize these points because experience has demonstrated that much has been tolerated by these sufferers through mistakes in the diagnosis, and by an ill-directed, overzealous local treatment.

Local Treatment

A few mild topical applications with a two to five per cent. silver nitrate solution are serviceable to reduce the hyperemia around the vera montanum. These applications should be made through the urethroscope and should not be repeated oftener than once in five days. Chilled metal sounds of large caliber may be tried when recent hypertrophic folds are discovered in the deep urethra, but this is the limit to which endourethral applications may be employed, and they must be discontinued when the symptoms become aggravated. The application of heat or cold, or of both in alternation, through the rectophore, is beneficial and non-irritating. A treatment every other day, lasting from five to fifteen minutes, is sufficient. A mild faradic current sometimes does good, especially in the motor neurosis of the sphincter and in the secretory neurosis. (For its technique see chapter on *Sexual Impotency.*)

Metal Sounds

Heat and Cold

Electricity

Prostatic massage, of so much benefit in

chronic prostatitis, seems to aggravate quite identical symptoms belonging to prostatic neurosis. More can be done here by a sensible prophylaxis than by any local procedures. It is true that neurosis of the prostate is found in men who have never had any venereal trouble; and it is equally true that a great many men have stubborn cases of prostatic infection, narrow strictures, and advanced lesions around the vera montanum without exhibiting any symptoms of neurosis. But it is apparent that a gonorrheal infection, a stricture or a chronic prostatitis, like any other predisposing cause, is likely to produce neurosis in an hereditarily, or otherwise, predisposed individ-

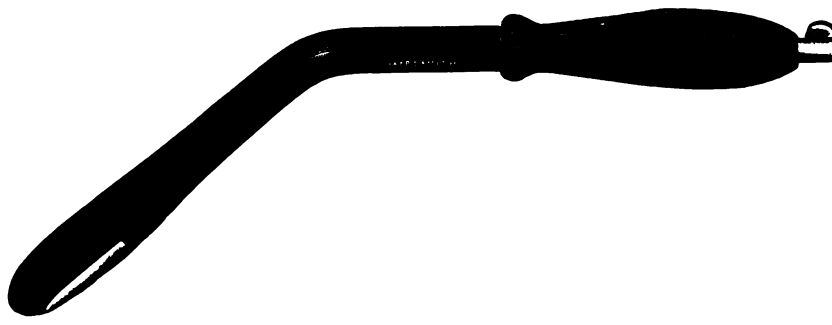


Fig. 111. Rectal electrode.

ual; just as well as any other predisposing cause is prone to produce neurasthenic symptoms in any part of the nervous system; indeed, most of the patients of this class have a neuropathic history.

It is evident that by avoiding gonorrheal infection, or by prompt and effective treatment of the latter, at least this one source of prostatic neurosis can be avoided.

General Hygienic Measures

Those who see numbers of these cases will find that better and more lasting results are oftentimes obtained by a general hygienic treatment, as indicated in neurasthenia, than by local procedures.

TUBERCULOSIS OF THE PROSTATE.

As gonorrhea is a predisposing cause in persons having an hereditary tuberculous taint, infection should be avoided. An existing gonorrhea should be very thoroughly treated. Medical treatment in the early stages of prostatic tuberculosis seems to have little effect, excepting in conjunction with general dietetic and hygienic measures to which, perhaps, most of the credit belongs. Guaiacol carbonate, .5 gm. to 1.0 gm. (7½ to 15 grains) three times a day; and ichthyol and aqua dest., equal parts, 10 to 45 drops three times a day, are recommended.

Medical Treatment

Guaiacol

Ichthyol

In the urethral type of the disease instillations may be tried with bichloride of mercury solutions, 1:5,000 to 1:2,000, or an iodoform-guaiacol mixture:

Local Applications

Bichlorid

℞

Iodoform,	1. gm. (gr. xv)
Guaiacol,	5. (gr. lxxv)
Olive oil,	100.

Iodoform

Of which 4 cc., 1 dram, are used.

Or

Gomenol oil,
10 per cent. to 25 per cent.

Gomenol

These instillations may be given every day or every other day.

With the exception of superficial erosions which heal under this treatment, the method is useful as a palliative measure only, as it does not, of course, reach the source of the disease.

Pain and tenesmus call for the liberal employment of opiates in the form of suppositories, or as small rectal injections:

Opiates

℞

Extracti opii,	.02 to .04 gm. (gr. 1-3 to ¾)
Extracti belladonnae,	.01 (gr. 1-6)
Olei cocao,	1. (gr. xv)

M.

S. To make one suppository.

Parenchymatous injections with iodoform emulsion have had their day.

Surgical Procedures

Curettage of the gland is a rational procedure in primary and uncomplicated tuberculosis and gives satisfactory results. It is performed through a perineal incision, the technique being the same as in prostatic abscess.

Total extirpation of the tuberculous gland has also been successfully performed for the same purpose, but no such radical surgical measures should be resorted to in the presence of extensive tuberculosis of the uro-genital tract, or in far-advanced pulmonary tuberculosis. However, opening of a tubercular prostatic abscess, or the excision of annoying fistulæ, is permissible in these cases and affords the patient much relief. The establishing of a suprapubic fistula might present itself as a matter of extreme necessity in some cases. These cases are sometimes very much benefited by a change to a dry and bracing climate; even a complete arrest of the disorder has been observed.

Influence of Climate

PROSTATIC HYPERTROPHY.

Prophylaxis

The treatment of prostatic hypertrophy is either palliative or radical. In order to prevent attacks of acute retention the patient should be advised of the injurious effects of exposure to cold, sexual and alcoholic excesses, protracted sitting, horseback and bicycle riding, all of which are likely to increase the congestion of the prostate. General hygienic instructions should be given regarding diet, exercise, regulation of the bowels, and for proper elimination through the skin.

Internal medication, electrolysis and parenchymatous injections to reduce the size of the gland have been discarded. Prostatic massage has no

value except when a chronic prostatitis incidentally associated with the trouble calls for it. Better temporary results have been observed from abdominal and perineal massage in the earlier stages of the disease. In a few cases encouraging improvement has followed the employment of the X-rays, directed to the posterior aspect of the glands, through a rectal tube, which produced a decided diminution in the quantity of residual urine, and of the size of the gland; others, again, were not benefited at all. The method is too new to allow of definite conclusions.

X-ray Treatment

The mainstay of the symptomatic treatment has been and is now systematic aseptic catheterization. It is used in every stage of the disease, in acute complete, and in chronic complete or incomplete retention. The physician confronted with a case of acute prostatic retention should be fully aware of the grave responsibility he is assuming. He is required to decide on the immediate steps for relief from the distressing symptoms, and when attempting catheterization he must be familiar with its technique and its dangers in prostatics. He must know that the acute retention is caused by a sudden edematous saturation of the tissues of the gland and of the prostatic urethra. The longer the retention lasts, the more it increases the edema and with it the obstruction. It is, therefore, useless and harmful to waste time with palliative measures such as opiates, hot Sitz baths and diuretics, and it becomes more and more imperative to draw the urine off by catheter.

Symptomatic Treatment

The Catheter in Acute Retention

Principally soft instruments should first be tried. It is a good rule to employ, in these cases, a catheter of the larger size, not less than No. 20 French, barring the presence of strictures which would not allow the passage of such a size.

Nelaton Catheter

These large catheters are not likely to be arrested in folds and small pockets, and, on account of

Fig. 112. Various catheters employed in prostate hypertrophy.

their greater firmness, can be pushed over a wide bulbous part or along the recesses of an over-

lapping median bar, and between the obstructing lateral lobes, while a small-sized instrument would be easily doubled up at these points. They can also be made firmer by an elastic whalebone bougie, as devised by Freudenberg, which is used like any other mandrin and is secured at the outer end of the catheter by an ebony cone in such a manner that injuries to the urethra are impossible.

Catheter-Mandrin

If the obstruction does not permit the introduction of these soft instruments, elastic silk-web catheters may be tried, which usually pass into the bladder readily. Their vesical ends have a short Mercier curve (catheter coudé) and they are commonly designated as "prostatic" catheters.

Elastic Catheters

The same shape can be imparted to a soft rubber catheter by Freudenberg's metal stylet which

Fig. 113. Freudenberg's whalebone bougie.

is made with a Béniqué or a Mercier curve. The instrument consists of a steel wire the proximal end of which is bent in such a fashion that it serves as a handle. The free end of this handle forms a hook which when crossed over the shaft secures the catheter previously pulled over the stylet.

The simplicity of this stylet makes it especially convenient when it is desirable to establish continuous drainage, as it can be fitted to an ordinary Nélaton, Malecot or Pezzer catheter.

Freudenberg's Metal Stylet

Should it be impossible to pass a soft or elastic instrument into the bladder, then a metal catheter with a free curve and a long beak may be used. When entering the deep urethra it is necessary to lower the distal end of the catheter between the patient's legs in order to bring the point of the

Metal Catheter

beak over the prostatic recessus and forward into the bladder. If the finger of the left hand is introduced into the rectum it will, in these difficult cases, assist in guiding the instrument through the prostatic urethra.

Continuous Catheter

If catheterization should be found extremely difficult and accompanied by much hemorrhage, continuous catheterization with all precautions mentioned elsewhere is then advisable, at least for a few days.

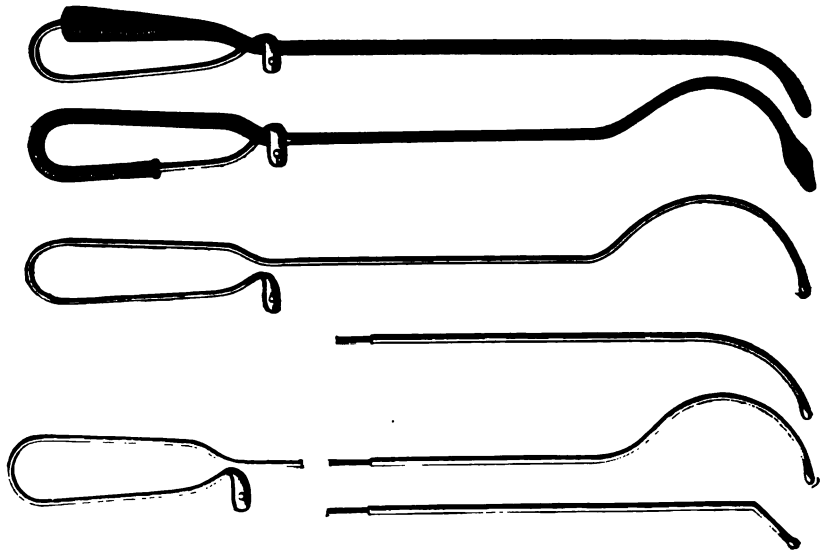


Fig. 114. Freudenberg's catheter stylet.

Suprapubic Puncture

If catheterization fails, either on account of the peculiar conformation of the obstruction, or because of the presence of false passages in which every kind of catheter becomes arrested, relief must then be given by suprapubic puncture or aspiration.

After shaving and cleansing the hypogastric region and the parts over the symphysis, the operator places the index finger of the left hand to the upper margin of the symphysis in the median line. The trocar is taken in the right hand and

Fig. 115. Suprapubic puncture. First step.

Fig. 116. Suprapubic puncture. Second step.

the index finger of this hand placed to within 1½ to 2½ inches of the distal end—the distance depending on the thickness of the integument. The trocar is then placed against the skin close to the point of the left index finger and briskly plunged downward until the index finger of the right hand touches the abdomen. The trocar stylet is now withdrawn, the canula connected with an aspirator or ordinary syringe, and the bladder slowly evacuated. Local anesthesia is hardly ever necessary for this small operation, except, perhaps, ethyl chloride applied to the skin.

After emptying the bladder of the necessary amount of urine the canula should be quickly withdrawn and the small punctured wound sealed with collodion.

This procedure, which may be safely repeated several times in succession, decongests the prostatic swelling and oftentimes the patient voids his urine spontaneously within a few hours, or at least the passage of a catheter is greatly facilitated.

In a case of unusually thick paniculus adiposus the regular sized trocar is not long enough to reach the bladder and it will be necessary to cut through the fatty tissue before the instrument may be safely employed. For these cases infiltration anesthesia will be required. Four to eight cc. (1 to 2 drams) of the following solution may be injected under the skin along the intended line of incision.

℞

Cocain hydrochlor.,	0.10
Morph. hydrochlor.,	0.06
Sodii chlorid.,	1.00
Aqua destil.,	100.0

M.

S. Schleich's solution.

The incision should commence close to the symphysis and extend 1½ inches upwards. The skin and fat are cut in the median line, the muscles separated by blunt dissection and the rest of the operation performed as previously described. In the latter operation, however, I would suggest to leave the canula *in situ* for a few days, thus establishing continuous drainage.

The patient should be kept in bed for a few days following the operation and urotropin given internally.

Danger of Sudden Evacuation

The sudden evacuation of the bladder may be followed by hemorrhage and oftentimes fatal urosepsis. This will most likely occur in chronic retention where the blood-vessels of the whole uropoietic tract are found much engorged, and have been kept under habitual pressure by the residual urine. Such bladders must be emptied very gradually. Not more than 300 cc. should be withdrawn on the first day, and not more than 100 or 150 cc. on each following day until the bladder is completely evacuated. Even then it is advisable to deposit 100 to 200 cc. of a mild antiseptic solution in the bladder for awhile. If the bladder is infected the injection of an antiseptic solution should begin with the first catheterization in such a manner that for each 100 cc. of urine withdrawn 50 cc. of antiseptic fluid is injected.

Systematic Catheterization in Second Stage

Undoubtedly a number of patients will regain the power of emptying their bladders after the first attack of complete retention, but as the gland grows in volume the attacks recur, and the second stage of hypertrophy—incomplete retention and increased frequency of urination—sets in. In this stage systematic catheterization is indicated, but is not often performed because the patient as a rule calls for relief either in the early stage, on the occasion of an acute retention, in the third

stage of complete retention, or near the end of the second stage when his nights are disturbed by the numerous calls to urinate.

Catheter Life in Third Stage

By systematic catheterization in the second and third stages of prostatic hypertrophy many patients can be made comfortable for a number of years, some even to the natural termination of their lives.

The frequency of catheterization depends on the quantity of residual urine. If this be 250 cc. or less, the urine should be drawn off once in twenty-four hours, preferably before retiring; if over 250 cc. and not more than 500 cc. it should be drawn off every twelve hours. Any amount of residual urine over 500 cc. requires catheterization at intervals of from four to eight hours.

The Continuous Catheter in Difficult Cases

Continuous catheterization is strictly indicated in the second and third stages when the passage of the catheter becomes very difficult and is followed by hemorrhage; when the bladder is infected; in hemorrhages of the prostate other than of traumatic origin; and in febrile conditions due to infection of the ureter and renal pelvis. Nélaton, Pezzer or Malecot catheters, preferably the latter, may be used. A rebellious cystitis will rapidly improve under this procedure, combined with the treatment described in the section on *Cystitis*.

Urinary Antisepsis

In all cases of prostatic hypertrophy complicated with urine retention, and necessitating catheterization, urotropin or other urinary antiseptics should be given internally.

Operative treatment of prostatic hypertrophy.

Surgical Treatment

No inflexible rule can be laid down regarding the operative treatment. Many points enter into consideration which determine our action, thus the age of the patient; his general health; the local conditions along the urinary tract; also the

disposition and environment of the patient should be taken into account.

As mentioned in a preceding statement, so it may be repeated here that neither acute nor chronic, neither incomplete nor complete retention of urine, as such, give an absolute indication for operative procedures. If a patient can be aseptically catheterized, or learn to do it properly as often as required, there is no demand for an operation, and many of those affected with prostatic

Fig. 117. Pocket catheter box with formalin capsule.

obstruction may in this way be kept in absolute or relative comfort for years.

Indications

But the situation changes as soon as infection takes place, when the passage of a catheter becomes difficult or impossible, when hemorrhages or fever occur and recur; then operative relief may be indicated to remove the obstruction, provided there is a fair prospect not only of restoring the normal function of the bladder, but also of prolonging the life of the patient.

Malignancy

Another point to be seriously considered is the fact, established by Albarran and Dallé, that nearly ten per cent. of all hypertrophic prostates show

more or less evidence of malignancy. It might be a question, therefore, in the face of such a statement, if we are justified in advocating the conservative course of treatment. I think we are, provided the patient is in a position to remain under close observation, and is willing so to do.

Sexual Operations

The so-called "sexual" operations (double castration and vasectomy), practised several years ago, have no virtue whatsoever so far as functional results are concerned and have been justly abandoned.

The operations in vogue at the present time are the galvano-caustic division of the prostate (Bottini operation), and prostatectomy.

Bottini's Operation

The Bottini operation aims to re-establish the free passage of urine by burning a passage through the obstructing lobe or lobes of the gland, whereby the vesical outlet is brought on a level with the deepest point of the bladder. The operation originally devised by the Italian surgeon Bottini owes its later-day popularity to Freudenberg, who improved Bottini's method and apparatus considerably.

Bottini operation. The incisor (Fig. 118) consists of a male and female arm; the male arm carries as a beak a platinum knife about 1.2 cm. long, which is extruded from a recess in the corresponding beak of the female arm by turning a wheel located at the other extremity, thus moving an Archimedean screw. A scale attached at the extremity of the male shaft of the instrument permits of an accurate determination in millimeters of the distance traveled by the knife.

Freudenberg's Incisor

The instrument has a small tube on each side of the female shaft, the beginning and end of a cooling apparatus by means of which a flow of water from an irrigator maintains a constant circulation to and from the point of the instrument. These

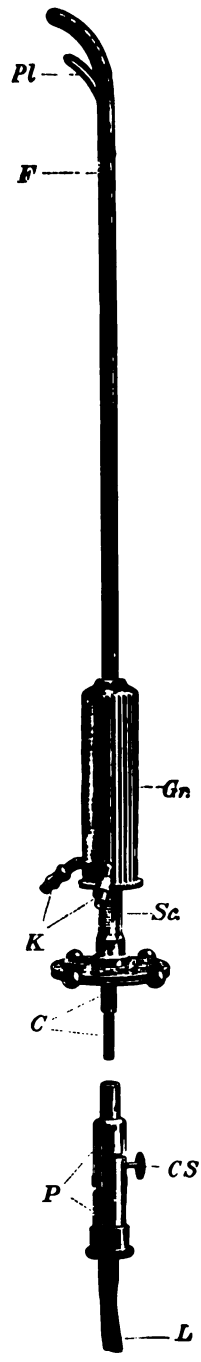


Fig. 118. Prostate incisor, Freudenberg model.

tubes enter the cylindrical, corrugated handle. The cautery-blade is composed of plati-iridium. The conduction of the current to and from the blade inside of the hull of the male shaft is accomplished through a single wire, the return conduction taking place through the hull of the main shaft, and, in consequence of its close contact with the outer tube of the instrument, through this also.

The connection of the instrument with the single current cable is effected by means of a peg-

Fig. 119. Storage battery.

like protrusion in the axis of the instrument, with the two poles in concentric arrangement, upon which the corresponding cable-contact is fastened. The latter has a small contact screw attached that opens or closes the current. The instrument can be sterilized by boiling.

The Electric Supply

The electric supply is furnished by a storage battery. With the assistance of an amperemeter the strength of the current circulating through the instrument, and consequently the intensity of the caustic effect of the knife, can be accurately determined. The street current can also be used

in place of the accumulator, provided a suitable transformer and a reliable rheostat are employed. This arrangement, introduced by V. Frisch, has the advantage of greater stability of the current.

Technique

The technique of the operation is very simple and can be described shortly. The bladder is thoroughly cleansed and then distended with air injected through a cotton filter, or with 150 cc. of an antiseptic solution such as boric acid, or 1 in 4,000 oxycyanide of mercury, or astorol. Oxycyanide of mercury should not be used in the urinary tract of a patient who has recently taken potassium iodid internally, because a caustic mercury-iodid compound would be formed, causing severe tenesmus and hemorrhagic cystitis. Now the instrument is introduced, its beak, upon entering the bladder, is turned to the side to be incised and, by slightly drawing downwards, brought in close contact with the vesical protrusion. The proper position of the beak may be ascertained by rectal palpation. The cooling apparatus is now brought into action, the circuit closed and the cautery-blade, at white heat, carried out of its recess and through the tissues by slowly turning the wheel to the right. After having cauterized the prostate to the desired length, the blade is slowly returned to its groove by reversing the wheel. In this manner the other lobes, if necessary, may be incised, and the instrument then withdrawn, after breaking the circuit.

Pre-operative Measures

If severe cystitis be present it should be subdued as much as possible previous to the operation. Regular irrigations of the bladder, or injections, as well as internal remedies such as urotropin, salol, camphoric acid, etc., and, if necessary, the use of the permanent catheter, are to be employed in the usual manner. When fever or inflammation of neighboring organs (epidi-

dymitis, etc.), or an acute or chronic septic condition of the patient be present, the operation should be postponed.

Value of Cystoscopic Examination

Wherever possible a cystoscopic examination should be made several days before the operation. In this way we obtain valuable information as to the condition of the bladder wall, knowledge of possible complications, like stones or tumor, etc., and an idea of the configuration and location of the obstructing vesical protrusions.

The Anesthesia

Local anesthesia of the posterior urethra, or lumbar anesthesia, may be employed. As a local anesthetic a solution of fifteen grains (1.0 gm.) each of cocain and eucain B. in one ounce (30 cc.) of distilled water is used.

The injection of three ounces of a warm two per cent. antipyrin solution into the rectum half an hour before the operation enhances the effect of the cocain or eucain.

Post-operative Treatment

If the patient empties his bladder immediately following the removal of the incisor, and if no, or a very mild, cystitis was present before the operation, no catheter need then be tied in the bladder, but this is necessary if there is much infection, or a favorable mechanical result is not apparent at once. Under the latter circumstances a catheter is allowed to remain in the bladder for from five to seven days, or at least until urine is expelled alongside of it.

Vesical irrigations may be made through the catheter as often as the local and urinary conditions require, and urotropin given internally.

The full result of the operation usually becomes apparent after the reactive swelling has subsided and the eschar has sloughed out, which takes from eight to sixteen days.

"To prevent the deposit of phosphates on the wound surface, in the presence of ammonical

urine during convalescence, a one per cent. iodoform-emulsion should be injected into the bladder daily or every other day."—(*Freudenberg.*)

Post-operative Hemorrhage

Post-operative hemorrhage observed in the second week is of no serious consequence. It is a granulation hemorrhage and may be readily checked by the injection of a pint of hot salt solution, or a few ounces of a 1 to 1,000 silver nitrate solution. In a stubborn case a large-sized catheter tied in the bladder for twelve hours might be required.

The patient is allowed to be about at the end of the first week after the operation.

Advantages

The advantages of the Bottini operation are:

First.—It can be performed with local anesthesia, a point which counts when we consider the age and more or less debilitated condition of many of the patients.

Second.—It does not destroy the sexual capacity.

Third.—It does not require a long confinement to bed.

Fourth.—It is not followed by fistula; rarely by incontinence; and never by other complications observed after prostatectomy.

Fifth.—If properly done, it is not accompanied by much hemorrhage.

Disadvantages

The disadvantages are:

First.—It is limited to a small proportion of enlarged glands.

Second.—It gives poor results in collar or horse-shoe-shaped obstructions, and none in enlargements which would require an incision longer than three cm.

Third.—The cauterization cannot be safely extended to obstructing nodules in the urethra proper.

Fourth.—Relapse occurs frequently because

partial cauterization of the prostate cannot prevent further progressive growth of the rest of the gland, and if relapse occurs and prostatectomy is then decided upon, the latter is rendered very difficult and sanguinolent on account of the thick and deep scars caused by the cautery blade.

From the author's experience with this method in nearly a hundred cases the operation is indicated: **Indications**

1—Generally speaking, in cases presenting a moderate enlargement of the prostate, or, expressed in figures, those cases in which the urinary distance (the length of the posterior urethra) is not more than three inches.

2—In very old, emaciated patients who cannot endure the shock of a general anesthetic and a prostatectomy, or in patients with advanced heart and kidney lesions. It must be admitted, however, that under lumbar anesthesia, prostatectomy can be safely performed on many patients suffering from these lesions.

A moderate infection of the upper urinary tract is not a contra-indication. Obviously, all these subjects will not live long enough to have a recurrence of the obstructive symptoms and most, if not all, of them will find relief for the rest of their lives with the least possible risk.

If in these cases the urinary distance amounts to more than three inches, which indicates enormous vesical protrusions, very little relief can be expected from the Bottini operation, and suprapubic drainage is advisable.

3—In the third group of patients on whom the Bottini operation may be performed, we include those who, although younger and in good physical condition and, therefore, suitable subjects for prostatectomy, will not consent to it on account of the greater risk connected with the operation

and the likelihood of becoming sexually incapacitated.

Prostatectomy

Prostatectomy. The first rational attempt at dealing with prostatic obstructions was made by Belfield, which was preceded by Dittel's partial perineal excision of the gland by separation of the rectum from the prostate without opening the urethra. Belfield's operation consisted in a partial prostatectomy through a suprapubic opening, eventually combined with the extirpation of the urethral obstruction by a perineal urethrotomy. As only the prominent portions of the prostate were removed, there was no immunity against recurrence.

Dittel's and Belfield's Early Attempts

The idea of enucleating the gland in its entirety was conceived and executed by Freyer. It consists in enucleating the gland in its capsule out of the encasing sheath, leaving the prostatic urethra with its accompanying structure behind, or removing it, as the case might demand.

Freyer's Suprapubic Method

"Before performing the operation the bladder should be thoroughly washed out with an antiseptic lotion, as in this disease the urine is almost invariably foul. The catheter employed for this purpose should be made of rather stiff gum elastic, and of the largest size that the urethra will readily admit. After washing out the bladder the catheter is left *in situ* and the viscus distended with boric acid solution." (The author uses air for this purpose, whereby some time is saved which otherwise is consumed for removing the fluid from the bladder.) "The nozzle of the large syringe employed for this purpose, and which is filled with the solution, is inserted in the end of the catheter, thus acting as a plug to prevent leakage from the bladder, the syringe being ready to further distend the bladder with fluid, if necessary, as the operation proceeds.

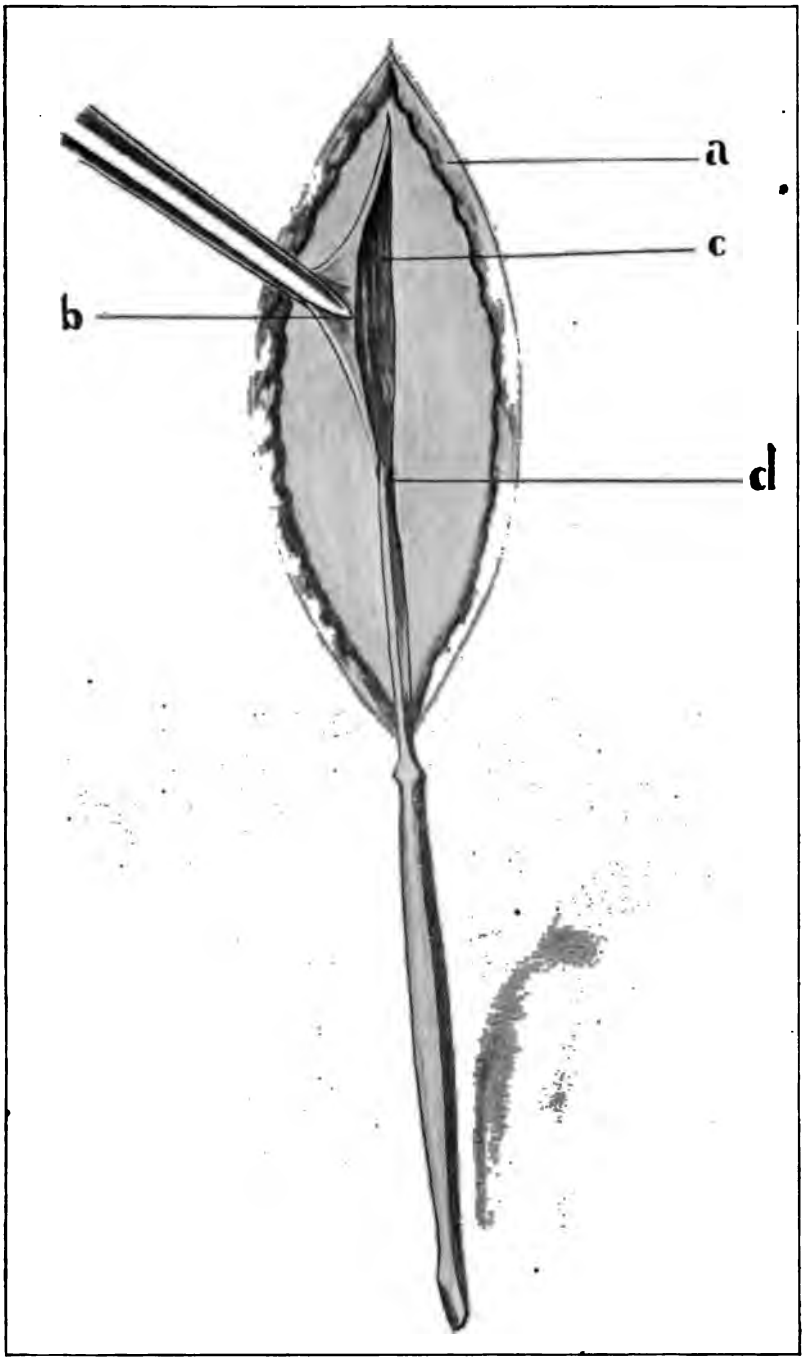


Fig. 120. a. Subcutaneous fat; b. rectus sheath; c. rectus muscle; d. incision in linea alba.

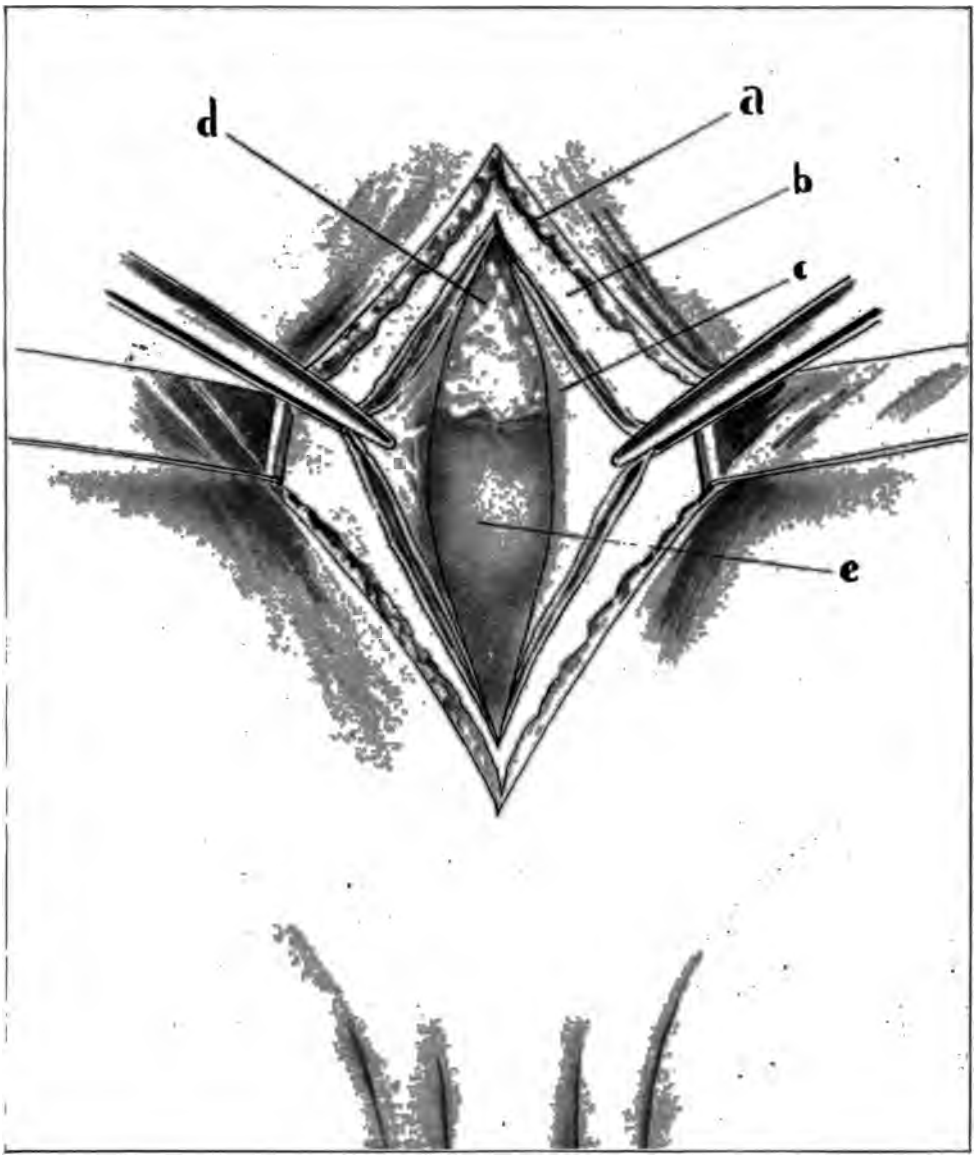


Fig. 121. a. Subcutaneous fat; b. rectus sheath; c. rectus muscle; d. prevesical fat with peritoneum retracted; e. bladder exposed.

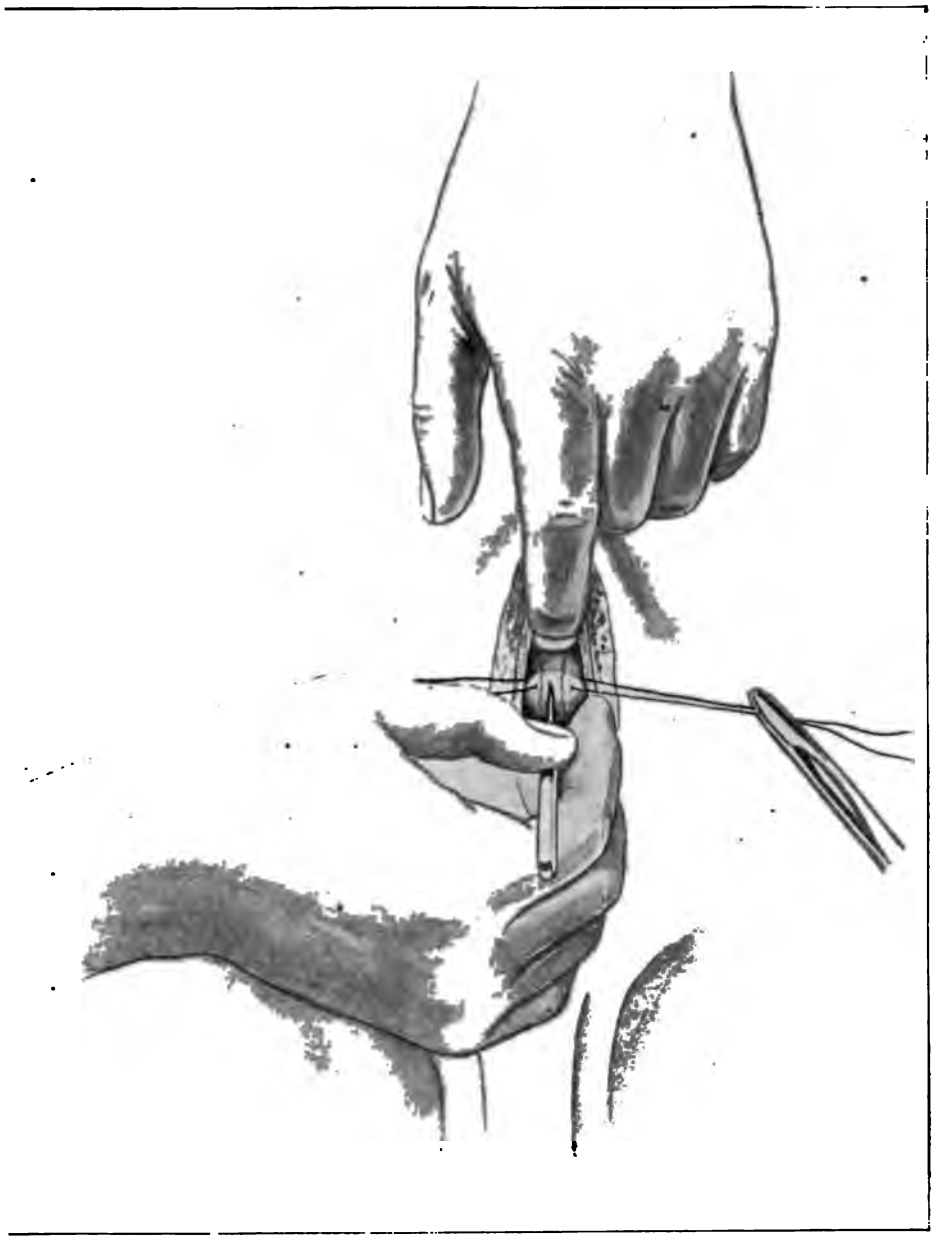


Fig. 122. Opening of bladder between two guide loops.

"An incision varying in length from two and one-half to three and one-half inches, according to the stoutness of the patient and the size of the prostate, is made in the median line of the abdomen, its lower end reaching to the level of the pubic arch. This incision is rapidly carried down through, or between, the recti muscles until the prevesical space is opened. Any bleeding vessels having been clamped by catch-forceps, the forefinger is introduced into the lower angle of the wound, and the prevesical fat scraped upwards off the bladder, by the finger nail, for the whole length of the wound. The peritoneum, which should not be seen, is thus pushed upwards out of harm's way, and the bladder then appears deeply in the wound, being quite tense, glistening, and of a pale white color, with large and tortuous veins coursing in its substance. Selecting an area devoid of veins the point of the scalpel is plunged boldly into the bladder, an incision about an inch long being made in a vertical direction towards the symphysis. The wound in the bladder can be subsequently enlarged if necessary, and this is best effected—because attended by less bleeding—by separating two fingers placed in the wound, and thus tearing the bladder wall to the required extent. On withdrawal of the scalpel the forefinger is introduced into the bladder as the solution rushes out through the wound, and a general examination of the interior of the viscus is made. Should calculi be present they are at once removed by forceps or a scoop.

Technique

"The forefinger of the other hand is next introduced into the rectum to render the prostate prominent in the bladder, and to keep it steady during manipulation by the first hand. The mucous membrane over the most prominent portion of one lateral lobe, or over the so-called middle

Detaching the Vesical Mucosa from the Gland

lobe, if there be but one prominence, is scraped through by the sharpened finger-nail, and gradually detached from the prominent portion of the prostate in the bladder." (Those who have short or soft nails will find the author's serrated knife very convenient for this work.) "This portion of the enlarged prostate is covered merely by mucous membrane, so that when this is scraped through and detached the true capsule of the prostate is at once reached.

Enucleation of the Gland

"Keeping the finger's point in close contact with the capsule, the enucleation of the prostate out of the enveloping sheath outside the bladder is proceeded with by insinuating the finger-tip in succession behind, outside and in front of one lateral lobe, thus separating the capsule from the sheath. The finger is then swept in a circular fashion from without inwards, in front of and to the inner side of the lobe, detaching this from the urethra, which is felt covering the catheter, and pushed forwards towards the symphysis between the lateral lobes which will, as a rule, have separated along their anterior commissure in the course of the manipulations. The other lobe is then attacked and treated in the same manner. The finger is next pushed well downwards behind the prostate, and the inferior surface of the gland is peeled away from the triangular ligament. When the prostate is left free within the sheath and separated from the urethra, with the finger in the rectum aided by that in the bladder, it is pushed into the bladder through the opening in the mucous membrane, which, during the manipulations, will have become considerably enlarged.

"The prostate, which now lies free in the bladder, is now withdrawn by strong forceps through the suprapubic wound. And it is astonishing through what a comparatively small suprapubic

wound a very large prostate can be delivered, owing to the elasticity and compressibility, between the blades of the forceps, of the adenomatous growth. Sometimes the lobes become de-

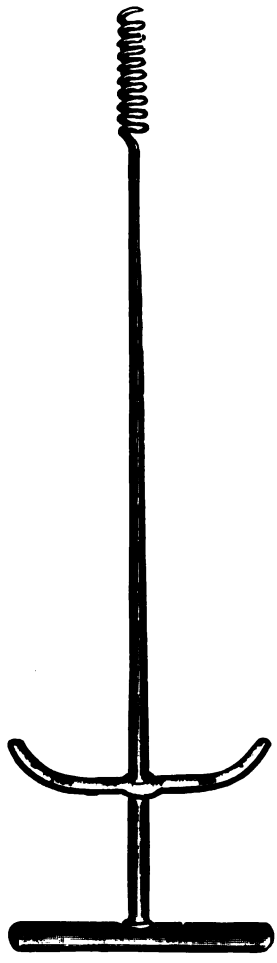


Fig. 123. Doyen prostate tractor.

tached along both anterior and posterior commissures and come away separately.

"Latterly the attempt to preserve the urethra entire in the enucleation of the prostate has been abandoned. There is no necessity of preserving

the vesical end of the prostatic urethra, as it is usually much dilated and distorted, and even if left behind is most likely, through lack of support and adequate nutrition, to slough and come away in the washings during the after-treatment. The defect caused by removal of this part of the ure-

Fig. 124. Author's serrated knife.

thra is in reality much smaller than it would seem at first, because the enucleation of this part of the gland brings the torn edges of the vesical mucosa in close proximity to those of the posterior urethra." (*Freyer.*)

While generally it is possible to enucleate the

prostate by Freyer's method, especially where the gland is of large dimensions, more or less difficulty is experienced with those of smaller size. Sometimes periprostatic inflammation results in an amalgamation between the capsule

Fig. 125. Liechtstern's enucleator.

propria and the surrounding sheath, which renders the separation extremely difficult if not impossible. In the absence of periprostatic adhesions, it is a better plan to fix a small gland on a tractor built like a corkscrew by which it is dragged upwards into view. The mucosa and the

sheath may then be split with a scalpel, or, better, with the author's serrated knife, and enucleation performed with the index finger or by means of an elevator. Where periprostatic adhesions form an insurmountable obstacle to enucleation the parenchyma may be removed by biting forceps (morcellation), of which various kinds should be on hand.

"With the delivery of the prostate from the bladder the essential part of the operation may be regarded as completed.

The forefinger of one hand is then reintroduced into the bladder forthwith, and that of the other hand into the rectum. The opposing surfaces of the cavity from which the prostate has been enucleated are then pressed together all around the vesical orifice between the tips of the fingers. By thoroughly kneading the opposed surfaces together in this manner the contraction of the cavity is facilitated and hemorrhage is thus arrested, just as a dentist presses the gum together after the extraction of a tooth, or the accoucher does the flaccid womb after parturition, with a similar object in view.

The bladder is then irrigated with hot boric acid solution (temperature about 110° F.) through the catheter still *in situ,* for the purpose of removing clots and, further, to control bleeding. This process should, however, not be continued for more than two or three minutes, as these irrigations not unfrequently promote bleeding instead of diminishing it, if the irrigation be continued too long. This I attrbute to the prostatic cavity being distended by the pressure of the fluid in the bladder.

Importance of a Stout Drainage Tube of Large Dimensions

The bladder having been cleared of clots, and while the irrigation is still proceeding, a stout india-rubber drainage tube is introduced through

the suprapubic wound. The dimensions and management of this tube I regard as of the utmost importance in the after-treatment of this operation. I have been gradually increasing the

Fig. 126. Freyer's drainage tube, actual size.

caliber of this tube until I now employ seven-eighths inch tubing with a lumen five-eighths inch in diameter. Two large perforations, or eyes, are made on opposite side of this tube and as near as possible to the vesical end. Only about

an inch of the tube should project into the bladder; just sufficient for the side openings to lie completely within its cavity. When the bladder is allowed to contract, the tube is gripped by the suprapubic wound therein, so that the whole of the urine escapes through the tube. In this way infection of the loose tissues in the prevesical space is obviated, and cellulitis prevented. On no account should the tube be inserted into the prostatic cavity, our object being to facilitate by every means the contraction of this cavity. If more than an inch of the tubing be introduced into the bladder it will press on the base thereof and give rise to constant straining and to pain in the end of the penis like that caused by vesical stone.

Placing of Sutures

The edges of the parietal wound should be brought together around the tube by silkworm gut sutures, one or two of which should pass deeply through the recti muscles. On no account should buried sutures be employed, as they are certain to be infected by the urine. One of the sutures should pass through the drainage-tube to keep it securely in position. No sutures are to be inserted in the bladder.

Before withdrawing the catheter and applying the dressings the bladder is once more irrigated, in order to remove clots and ascertain that drainage is quite free. Finally a couple of inches of broad iodoform-gauze tape are inserted in one angle of the wound against the side of the tube, and left there for twenty-four hours. This is done for the purpose of preventing the accumulation of fluids in the prevesical space.

The wound is now covered with cyanide of zinc gauze and the patient freely swathed in absorbent dressings—front, sides and back. The whole dressing is kept in place by a broad flan-

nel binder or many-tailed bandage, loosely applied. Cotton-wool, wood-wool tissue, or cellulose may be employed. The last is most absorbent and keeps the patient driest, but a thin layer of cotton-wool should be placed between it and the skin, otherwise the cellulose, when wet, forms a pulp, which adheres to the skin and feels cold and clammy. The dressings should be changed when saturated with urine, every four or six hours, according to the quantity of fluid secreted. During the first twenty-four hours after operation there will generally be some clots of blood found lying in the drainage-tube; these should be removed by long slender forceps at each dressing.

Post-operative Treatment

The bladder should be irrigated once daily by the surgeon himself, with warm boric acid solution or a weak solution of permanganate of potash. For this purpose a long glass nozzle attached to the rubber tubing of an irrigating can is best, the nozzle being introduced through the drainage tube. During the first few days there should be very little pressure of fluid on the bladder, the irrigating can being held, or placed on a table, a little above the level of the patient's abdomen, so that the solution flows into the bladder and out again through the drainage tube with very little force. It is all-important that in the early days drainage should be thoroughly free, and that no pressure should be thrown on the cavity from which the prostate has been removed, either by the accumulation of urine in the bladder or by pressure from a high column of irrigating solution. Thus the cavity may remain at rest, and the blood-clot adherent to its surface may be undisturbed, all of which will obviate bleeding and facilitate the healing process. This is the main object for which I employ such a stout

drainage tube—that the urine and clots may freely escape through it, and that, consequently, there may be no straining, which would have the effect of dilating the wound cavity. Patients who pass no urine *per urethram* for ten or twelve days after operation almost invariably do best.

Rest in Bed

The patient should lie on his back for twenty-four hours, after which he should be placed alternately on either side and on his back. During the first four or five days he should not be allowed to make any exertion, all movements being effected by nurses. Should there be any oozing of blood after the operation the foot of the bed should be raised on blocks, and hypodermic injections of ergotin given. I have seen no hemorrhage requiring more active measures in connection with this operation. Shock, when it occurs immediately after operation, should be treated by warmth from hot-water bottles, extra clothing, hypodermic injections of strychnia, and enemata of coffee and brandy. Pain in or spasm of the bladder should be relieved by hypodermic injections of morphia. Should there be any bronchial catarrh, or other lung affection, the patient's head and shoulders should be raised by pillows after the first twenty-four hours succeeding the operation. And in any case, this position should be encouraged early so as to obviate hypostatic congestion of the lungs.

Ergot

Heat

Strychnia

Opiates

Removal of Tube

As a rule, I remove the tube four days after operation. If the patient be thin the tube may be dispensed with in three days, if very stout it should be left in for five days. By this time plastic lymph will have been thrown out around the tube, thus shutting off the prevesical space from contact with the urine, and in this way avoiding the occurrence of cellulitis; and a free opening will also have been established down to the blad-

der, the wound in which may now be allowed to close as rapidly as nature can accomplish this by granulation.

The sutures are removed on the seventh or eighth day, by which time primary union will have taken place in the parietal wound, save, of course, in the track of the tube." (Freyer.)

Irrigation of the bladder must be continued daily—twice daily, if the urine be at all foul—by inserting the long glass nozzle of the irrigator through the fistula right down into the viscus. The return stream will in the early days flow out beside the nozzle, but as the fistula contracts the nozzle will fill it, and the irrigation is then accomplished by alternately filling the bladder with the solution and then withdrawing the nozzle, when the fluid will rush out with more or less force. As the case advances, more and more pressure on the bladder may be employed. The irrigation should be continued until the boric solution returns quite clear, or the permanganate solution is unaltered.

Irrigations

After nine or ten days from the operation, Janet's method of irrigation may be employed, if possible. This consists of introducing the glass nozzle into the urethra and gradually raising the irrigating can until the column of fluid forces the solution into the bladder and out through the suprapubic opening. This is, perhaps, the best method of flushing out the bladder, but some patients will not tolerate it, owing to the pain produced. It should never be employed during the first week after the operation for fear of causing bleeding, and if it causes pain, it should not be employed at all. Patients vary much in their tolerance of this method of irrigation.

After a fortnight or so, when the bladder is distended by the solution through the nozzle placed

in the suprapubic opening, the patient will frequently pass the solution *per urethram* as rapidly as it enters the bladder. When this takes place it is an effectual method of flushing out the bladder.

Catheter

It will be observed that no reference has been made to the employment of the catheter for the purpose of washing out the bladder during the after-treatment. In the early days after the introduction of the Freyer operation, a large-sized gum elastic catheter was introduced through the urethra daily, beginning with the third or fourth day after the operation, and irrigation of the bladder was done through this. The catheter was introduced partly on account of the apprehension that contraction of the deep urethra might ensue during healing of the prostatic cavity. Experience, however, has taught that such fears were

Fig. 127. Author's case. Actual size of prostate removed by Freyer's method, and stone from retroprostatic pouch.

unfounded, for not in a single instance has there been contraction such as to interfere with the free flow of urine. A catheter is therefore not now introduced until the suprapubic fistula has contracted to such narrow dimensions as not to admit the irrigator nozzle, and irrigation in consequence becomes precluded in this way. It is employed only during the few days before the patient begins to pass urine *per urethram* in volume, in order to keep the bladder clean during this transition period. When once natural micturition is established, the bladder is, of course, automatically flushed out.

Management of the Bowels

The management of the bowels is of the utmost importance. For three or four days previous to the operation the bowels should be freely moved once daily at least, by means of a laxative pill given at night, followed by a mild saline in the morning. On the morning of the operation the lower bowel should be emptied by an enema. The bowels should then be left undisturbed for three or four days, when they should be freely moved by castor oil or liquorice powder, or any drug which may be depended upon to act with certainty and efficiency. After this the bowels should be moved gently once a day by means of a pill taken at night or a saline in the morning, or both if necessary. Patients of the prostatic age confined to bed are liable to the accumulation of feces in the rectum, forming a hard mass, owing to the want of tone in the bowel. The occurrence of this is attended by much discomfort and spasm of the bladder from pressure thereon, and this must be guarded against. Should this condition be suspected a finger should be introduced into the rectum and the mass, if found, broken down and removed by an enema of warm olive oil.

"Patients should, as a rule, be confined to their

room, but not necessarily kept in bed, for three or four days before the operation. Poor, broken-down hospital patients will require to be kept under observation for several days at least, in order that they may be fed up, and their general health improved before operation." (*Freyer.*)

Goodfellow's Perineal Prostatectomy

Perineal Prostatectomy. After Otto Zuckerkandl had demonstrated the feasibility of reaching the prostate through a prerectal incision, various methods of perineal prostatectomy sprang up. The most simple of all is Goodfellow's operation.

"If required, a few days before the operation, urotropin in seven or ten grain doses is given twice or three times daily. The usual pre-operative procedures are carried out—thorough cleansing, external and internal, the rectum being emptied by an enema a few hours before the operation.

Position

With the patient in the ordinary lithotomy position, the legs held by assistants, the bladder being empty or full, as the case may be, a lithotomy staff is introduced, the legs then elevated somewhat, a median incision from the base of the scrotum to the margin of the anus is made, and carried to the membranous urethra, which is entered with a lithotomy knife and the opening extended into the bladder. The finger is then introduced, the staff removed, and the moderate flexion of the legs and thighs on the abdomen and the thorax increased to as great an extent as possible, then with the opposing hand over the hypogastrium the bladder is depressed, and the enucleation, beginning at the beak of the prostate below and working upward next to the bladder, is carried on, the time consumed for complete enucleation rarely being over five minutes, the resulting hemorrhage virtually nothing. The gland may be removed entire, or lobe by lobe. If

the bladder has been full of pus, sometimes it is washed out. No drainage of any kind, gauze, tube or catheter is made, the perineal incision sufficing.

It was formerly the practice to pass a straight sound through the perineal wound into the bladder every other day for a week or more to keep free drainage, and in any complicated cases such course might be adopted, but of late it has not been found needful. In all recent cases no instrumentation of any kind has been permitted, neither irrigation, passage of sounds nor catheters; and all have done as well or better than under the older process.

No Instrumentation After Operation

"The patients are allowed to get up as soon as they feel like so doing, and the urethra is generally closed within eighteen days. Frequently some urine passes naturally within forty-eight to seventy-two hours, the quantity increasing as the wound closes, until all is voided by the urethra. What becomes of the prostatic urethra?—has been asked. The answer is that part or all is removed with the gland, an incident that in no manner seems to affect the restoration of the continuity of the urethra, nor the power of the bladder to retain and control its functions, nor is stricture or occlusion caused.

Ligation of Ducts

"Ligation of the ducts seems to be an irrational refinement, especially as many patients have to a greater or lesser extent, regained sexual vigor. Epididymitis is an occasional sequel, but only in cases where post-operative instrumentation has been practiced.

"The points to be expressly emphasized are the position and the incision into the bladder. Upon these rests the unvarying success. The former gives free access to the gland and bladder, while the latter permits rapid ablation of the gland, the viscus can also be thoroughly explored with the

finger or through the speculum, as could be the vagina in like position, and, obviously of equal importance, complete drainage is established. Where an inter-ureteral band exists the practice is to cut through that.

"In none of the operations have retractors, specula, or other instruments been required to assist in the removal of the gland, the finger serving all needs." (*Goodfellow.*)

Young's Partial Prostatectomy

Young's operation of partial prostatectomy, which aims to preserve the sexual capacity, while very ingenious, has little practical value and does not conform to the chief principle of total enucleation.

The preservation of the sexual capacity amounts to little in a disease of such importance, and most of these patients come under care at an age when sexual considerations have become of secondary importance, or the sexual power is already extinct. Furthermore, cases are on record in which Young's operation failed in the above purpose, and others in which the sexual capacity remained intact after total enucleation of the gland; and last, but not least, the remaining portion of the prostate will behave just as it does after a Bottini operation, it will eventually grow and cause renewed obstruction.

Dangers of Prostatectomy

Neither the perineal nor the suprapubic route is free from danger considering the age and oftentimes debilitated condition in which these patients apply for relief. The dangers due to general anesthesia have been materially lessened of late, since the improved technique of lumbar anesthesia. By thorough pre-operative preparation and post-operative attention the mortality has been reduced and satisfactory results increased.

In order to avoid the bothersome epididymitis observed after the operation, bilateral vasectomy

three days before the prostatectomy has been successfully introduced as a routine procedure where the bladder shows evidence of infection.

Each route has its followers, but it seems that recently many of the ardent advocates of perineal prostatectomy have become more and more partial to the suprapubic operation. The author submits that the hypertrophied gland should be approached by the shortest route, and this is usually the suprapubic. Where the perineum is not very deep and vesical protrusions not very high, perineal prostatectomy may become the operation of choice, but even then the suprapubic operation should be preferred if other vesical lesions are suspected or known to exist.

Contra-indications

Prostatectomy should not be performed in very enfeebled, old men, or in the presence of bad unilateral or bilateral pyelitis or pyonephrosis. However, by a thorough preparatory treatment some of these cases can be put in condition for the operation. By continuous catheterization and vesical irrigations kept up for weeks, and by the internal administration of urotropin and tonics, the fever generally subsides, the urine loses its offensive character, the appetite and digestion improve and with these the physical condition frequently changes so much as to render the patient fit for the ordeal.

Prostatectomy in Two Stages

The injection of three cc. of a one per cent. iodoform suspension following every irrigation of the bladder is very efficient when the urine is ammoniacal. The operation in such cases may be still rendered less serious by performing it in two stages. In the first the incision is carried down to the bladder, or, what seems more rational, the bladder is opened and drained. This step requires only a local anesthetic. A week afterwards the prostate is removed, which can be done under nitrous oxide gas or somnoform anesthesia.

In cases of prostatic obstruction in which, while surgical relief is urgent, neither the Bottini operation nor prostatectomy are indicated or can be performed (for any of the previously mentioned reasons), we have two palliative procedures, viz., the *Poncet operation* and the establishing of a *suprapubic fistula.*

Cystostomy

The former is a suprapubic cystostomy rapidly performed under local, scopolamin or lumbar, anesthesia. The bladder is opened suprapubically and its cut edges sutured to the cut edges of the skin, resulting in a permanent fistula. No drainage is required, the urine flows out of the abdominal opening and is absorbed by pads which, when saturated, are changed. The lower abdomen, the flanks and the upper part of the thighs are anointed with equal parts of lanolin and vaseline to protect the skin from being macerated by the urine. The patient may sit up the following day. The operation is especially indicated in very emaciated individuals, where shock and loss of even a small quantity of blood counts for a good deal, and a long sick-bed sojourn enhances the danger of pneumonia.

Suprapubic Fistula

The milder procedure consists of establishing a suprapubic fistula under local anesthesia. A medium-sized, straight trocar is plunged into the bladder in the usual manner and the stylet withdrawn. A soft rubber Nélaton catheter stiffened by a metal mandrin is pushed through the trocar canula to the bottom of the bladder and the canula withdrawn over the catheter, which is steadied by the mandrin lest it be pulled out simultaneously with the canula. A safety-pin penetrating the catheter and held down to the abdominal wall between two layers of adhesive plaster strips secures the tube in its position.

The urine is drained off in a suitable vessel

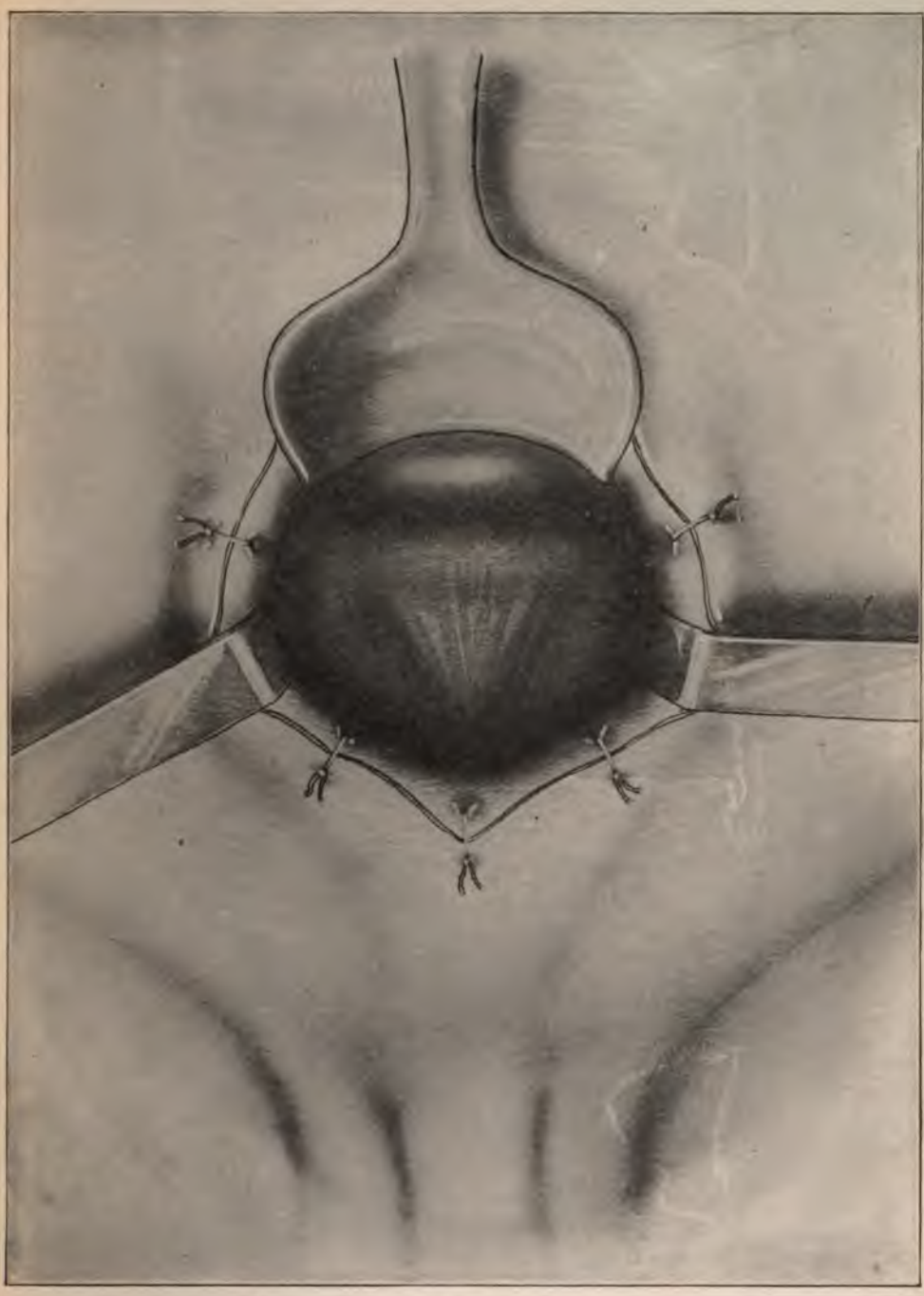


Fig. 128. Poncet operation—cystostomy.

and the bladder irrigated through this tube or through a catheter placed in the deep urethra, allowing the fluid to run into the bladder and out through the suprapubic tube.

Exchange of Drainage Tube

After four days the wound canal has assumed a definite shape and is covered with granulations permitting the withdrawing of the tube and its

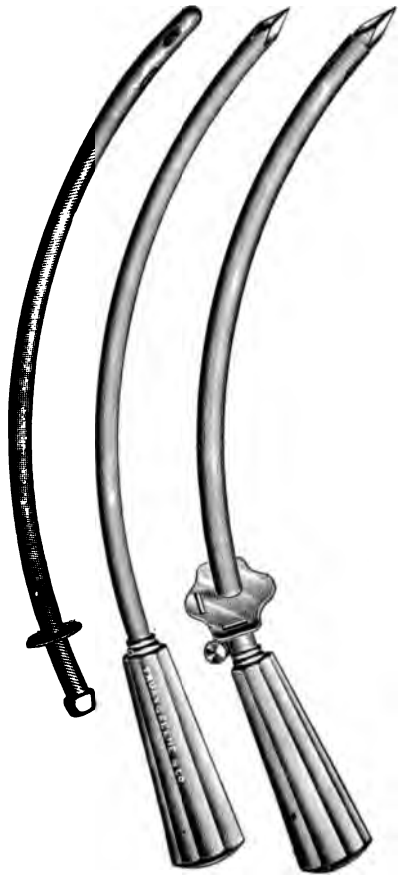


Fig. 129.

replacement by a clean one. If kept open in this way for a while the fistulous canal becomes larger and finally leakage occurs around the tube. In this stage the author's apparatus for suprapubic

drainage, described in the section on *Cystitis* will be found serviceable.

With the re-establishing of free urination the work of the surgeon is not always finished. The secondary lesions caused by the disorder are oftentimes so far advanced that the removal of the obstruction is not sufficient to heal them. This statement is made with reference to chronic cystitis, the trabeculation and sacculation of the bladder wall. Many times it is necessary to treat this cystitis for a long while, or even for the rest of the life of the patient, to prevent the formation of phosphatic concretions in the bladder or in a diverticle. If this point be neglected the patient will derive very little if any benefit from the operation.

Postoperative Treatment

It might seem unnecessary to emphasize the importance of a correct diagnosis before operating for prostatic hypertrophy, and yet daily experience justifies it. The following points should be remembered:

Diagnostic Errors

1. *Not every prostato-megaly is a prostatic hypertrophy.*

2. *Not every urinary difficulty in a man whose hair is gray is necessarily due to prostatic enlargement.*

3. *Not every large prostate in advanced age blocks the free flow of urine.*

4. *Strictures and the so-called encircling fibres at the vesical neck will also cause urine retention, and they are not an exclusive privilege of youth.*

5. *Traumatism and syphilis produce sphincter spasm and detrusor paralysis associated with more or less urine retention.*

CAPTER IX.

DISEASES OF THE KIDNEY.

INJURIES OF THE KIDNEY.

The treatment of injuries is determined by the immediate symptoms, and the lesions of the organ caused by the trauma.

Shock

Shock and collapse are combatted by an hypodermic injection of a ten per cent. camphorated oil solution; by the application of heat around the body; and by absolute rest in bed.

Camphorated Oil

Heat

Rest

Ergot

Not much may be expected from internal medication to check hemorrhage, but the fluid extract of ergot in doses of two cc. (3ss), every three hours may be tried. It may also be administered subcutaneously in conjunction with camphor water.

For the troublesome thirst and nausea, the sucking of small pieces of ice is useful.

Pain

Pain is allayed by anodynes and by supporting the lumbar region with a flannel bandage or by applying strips of adhesive plaster.

Diet

The bowels should be evacuated by a non-irritating cathartic, or an enema, and a very light, non-liquid diet prescribed, lest the activity of the kidneys be increased. Clots of blood which accumulate in the bladder, and which are not spontaneously expelled, should be removed by all means to prevent decomposition and a possible resulting ascending infection of the kidney. Suprapubic cystotomy might here become imperative if evacuation cannot be accomplished through a catheter, or by aspiration with an evacuation pump attached to a large-sized metal bougie.

Removal of Blood-clots

Indications for Surgical Procedures

Operative procedures will be indicated under the following conditions:

1. When conservative measures fail to check the hemorrhage within a reasonable time.
2. When the collapse is of long duration, or recurs.
3. When a palpable tumor, due to hematoma, in the kidney region persists.
4. When septic symptoms appear which are due to the extravasation of blood and urine.
5. When the ureter is firmly blocked by blood clots, causing severe and lasting renal colic.

Technique

Technique.—After exposing the kidney by a lumbar incision the steps to be taken will vary with the nature, location and extent of the lesion. Suture of a rent will suffice in one case, while others may require partial resection, or even total extirpation, of the kidney.

It may be appropriate to here say that while the expectant plan is the one to be adopted at the start, in the majority of injuries of the kidney, one should not hesitate to resort to surgery if conditions are such that the life of the patient would become endangered by unwarranted delay.

In very severe crushing or penetrating injuries the symptoms are usually so pronounced that a mistake about the extent of the lesion is hardly possible, but occasionally some of these symptoms are absent or so slight at the onset that the real nature of the trouble may remain obscure at least for a while. This statement is made with special reference to hematuria, which may be entirely absent owing to the ureter becoming blocked by blood clots, while a fatal bleeding may take place into the perinephric tissues. On the other hand hematuria may be very profuse, and yet due to congestion of the parenchyma only. It is, therefore, necessary to consider all the symptoms, sub-

Hematuria

jective and objective, when deciding on the course of management of a traumatic injury of the kidney.

MOVABLE KIDNEY.

In the care of movable kidney we should consider three important points:

1. The etiology.
2. The nervous, gastric, intestinal, and genito-urinary disturbances, either caused or aggravated by the prolapsed kidney.
3. The structural changes in the organ itself.

Prophylaxis

Regarding the first point proper attention should be given to its prevention. This can be accomplished by a reasonable hygiene of pregnancy and the puerperium, whereby enteroptosis, a frequent causative factor of movable kidney, may be avoided. A suitable abdominal supporter should be worn during the second half of pregnancy and an abdominal binder during the puerperium, which, however, should not be so tight-fitting as to cause subinvolution and retroflexion of the uterus. The same precautionary measures are indicated after the removal of large abdominal tumors.

Abdominal Supporter

If enteroptosis has developed an abdominal supporter should always be worn, except at night. The abdominal muscles may be strengthened by electricity, gymnastics, or massage. The latter must be performed in such manner that traumatism of the kidney is avoided. How careful one ought to be in this respect can readily be demonstrated by the appearance of blood and albumen in the urine after a somewhat prolonged palpation of such a kidney.

Treatment

In the treatment of mild cases of movable kidney we should try conservative measures first. Oftentimes a suitable bandage will relieve the patient completely, or at least to a satisfactory de-

Bandage

gree. A strip of zinc-oxide adhesive plaster about four inches wide may be used instead of a bandage. In applying the plaster the patient should be placed in the Trendelenburg position, and after the kidney has been replaced a strip of plaster about four inches wide should be placed diagonally across the abdomen beginning below the crest of the os ilium on the opposite side and extending upward below the affected kidney, across the upper part of the abdomen and around the chest, terminating beyond the spinal column behind.

Rest Cure

By keeping emaciated patients on their backs for from four to eight weeks and simultaneously combining this with the Weir-Mitchell rest cure, good results are occasionally obtained, because this method, as it is claimed, favors the accumulation of fat around the kidney. The credit for the improvement, I think, is perhaps to no lesser degree due to the restoration of the nervous equilibrium and the regulation of the other functions, as we may expect from a well planned rest cure.

If a movable kidney is found without causing any symptoms it is best left alone and the patient kept in ignorance of the anomaly. However, the urine should occasionally be examined in order to ascertain the absence of structural lesions in the kidney caused by the displacement. If nervous or gastro-intestinal symptoms are present, but without complications demanding surgical relief, conservative methods should be first tried.

Indications for Surgical Relief

Operative measures are indicated:

1. When conservative treatment fails to afford relief.
2. In intermittent hydronephrosis and renal colic due to repetition of kinking or curvature of the ureter, and for the prevention of structural changes in the kidney due to the twisting of the pedicle.

3. In severe gastric, intestinal, or nervous disturbances due to displacement of the kidney.

Nephropexy

The good operative results are not always immediately observed, and depend on the degree to which the subsequent lesions in other organs have advanced. The operation for the relief of this disorder is called nephrorrhaphy or nephropexy. Its purpose is to return the displaced kidney as near as possible to its original and normal position in such a manner that a recurrence of its prolapse may be rendered impossible.

Various and sometimes very complicated methods have been devised for this purpose, but the latter can be accomplished in the simplest way, as long as a solid union between the lumbar muscles and the kidney is the ultimate result; and Casper's procedure of decapsulation would suffice if it were possible to keep every patient immovable on his or her back for weeks until firm adhesions have formed. It is safer, however, to secure the organ by a few sutures which penetrate the capsule and all muscular layers of the loin.

Decapsulation

Fixation

Technique

"An incision is made along the outer border of the erector spinæ muscle, beginning just below the twelfth rib and extending downwards parallel with the spine for about three inches. Its distance from the spine will vary with the width of the back from three and one-half to four inches. This incision is made with the knife through the skin and fat down to the superficial fascia covering the muscles. The superficial fascia is then divided with scissors to the extent of the wound above and below. The underlying muscles down to the erector spinæ are then separated in the direction of their fibres with blunt, round-pointed scissors, with the aid of blunt hooks inserted in the center of the incision and drawn towards the

extremities of the wound. Broad, strong retractors are now inserted and an assistant forci-

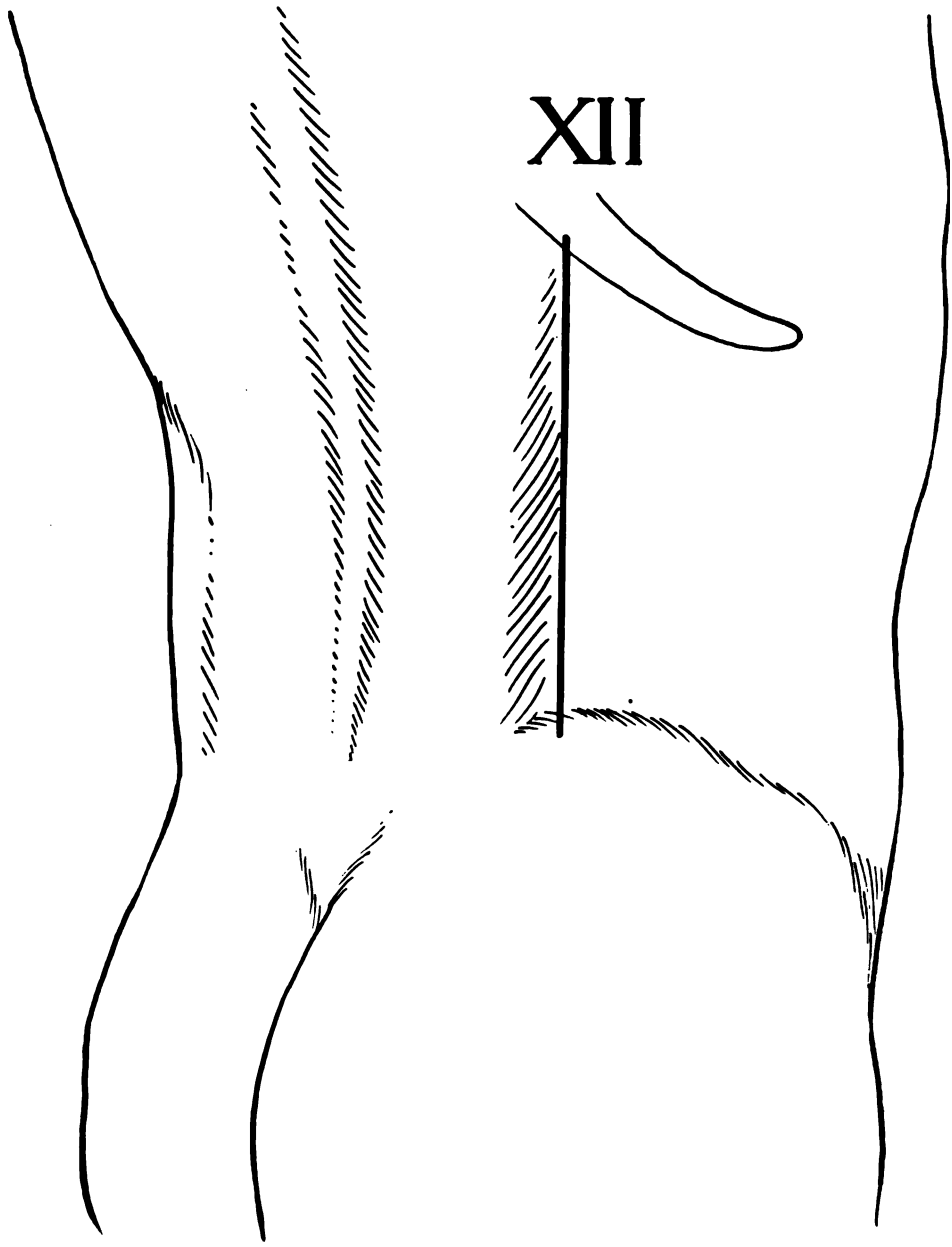


Fig. 130. Incision through skin and muscles, in operation for movable kidney.

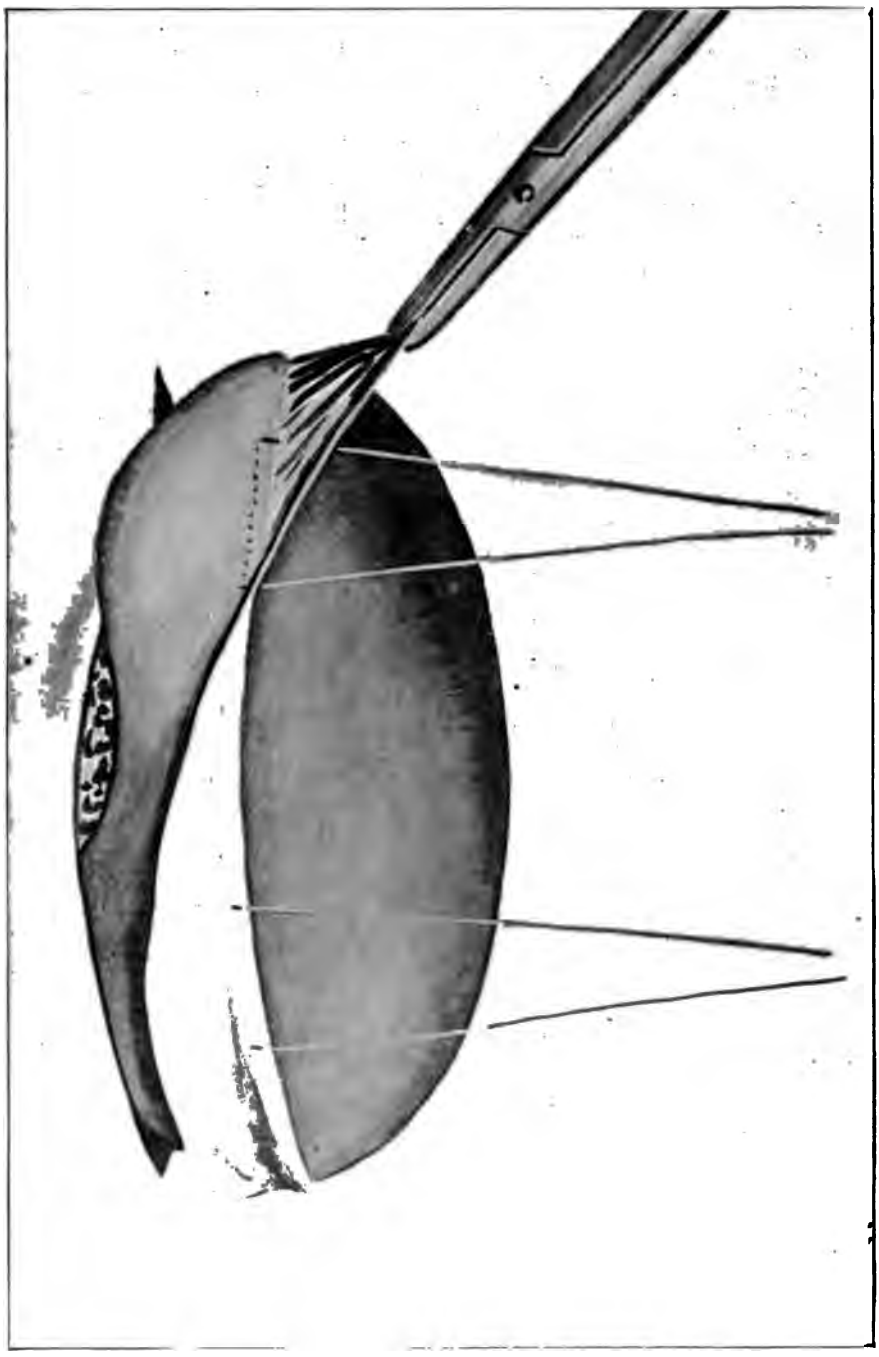


Fig. 131. Edebohl's method. Placing of loops through the capsule.

bly retracts the margins of the wound, including all of the separated muscles. The erector spinæ can usually be retracted towards the spine by including its outer border in the retractor on that side. If its attached fascia does not yield readily it is carefully divided with scissors, exposing the quadratus lumborum beneath. The fibers of this muscle, which is broader than the erector spinæ, will frequently overlap the line of incision, and they must be carefully separated with blunt hooks down to the deep fascia, so that the ilio-hypogastric nerve with its accompanying vessel will be drawn aside and not wounded. The retractors are made to include this structure also, care being taken to hold the nerve and vessel aside, and to expose the deep fascia beneath, which may then be divided with scissors to the extent of the wound, and immediately the fatty capsule of the kidney beneath will bulge up into the wound. The retractors are made to include the margins of this fascia also, and they should be forcibly separated so as to stretch the wound to its extreme limit.

The fatty capsule is now drawn down and opened with scissors well over toward the spine, and from the center of the wound to its upper limit, and thus the risk of opening into the peritoneum at the lower pole of the kidney is avoided. The margins of the fatty capsule are caught with T-forceps and drawn out, carrying the kidney up with it into the wound. If the kidney is found adherent to the fatty capsule, as is frequently the case, it is carefully separated along its free border, around and under its lower pole, and well back on its posterior face nearly to the hilum. In this way a considerable area of surface is exposed for approximation with the muscles of the back for adhesion." (*Goelett.*)

The fibrous capsule on the convexity of the kid-

ney is split for a distance of three to four inches, and stripped down to the middle of the lateral surfaces. Two loops are drawn through the

Fig. 132. Loops drawn through muscles.

loosened part of the capsule on either side where it joins the kidney. The median four of the eight threads of these loops are now drawn through the

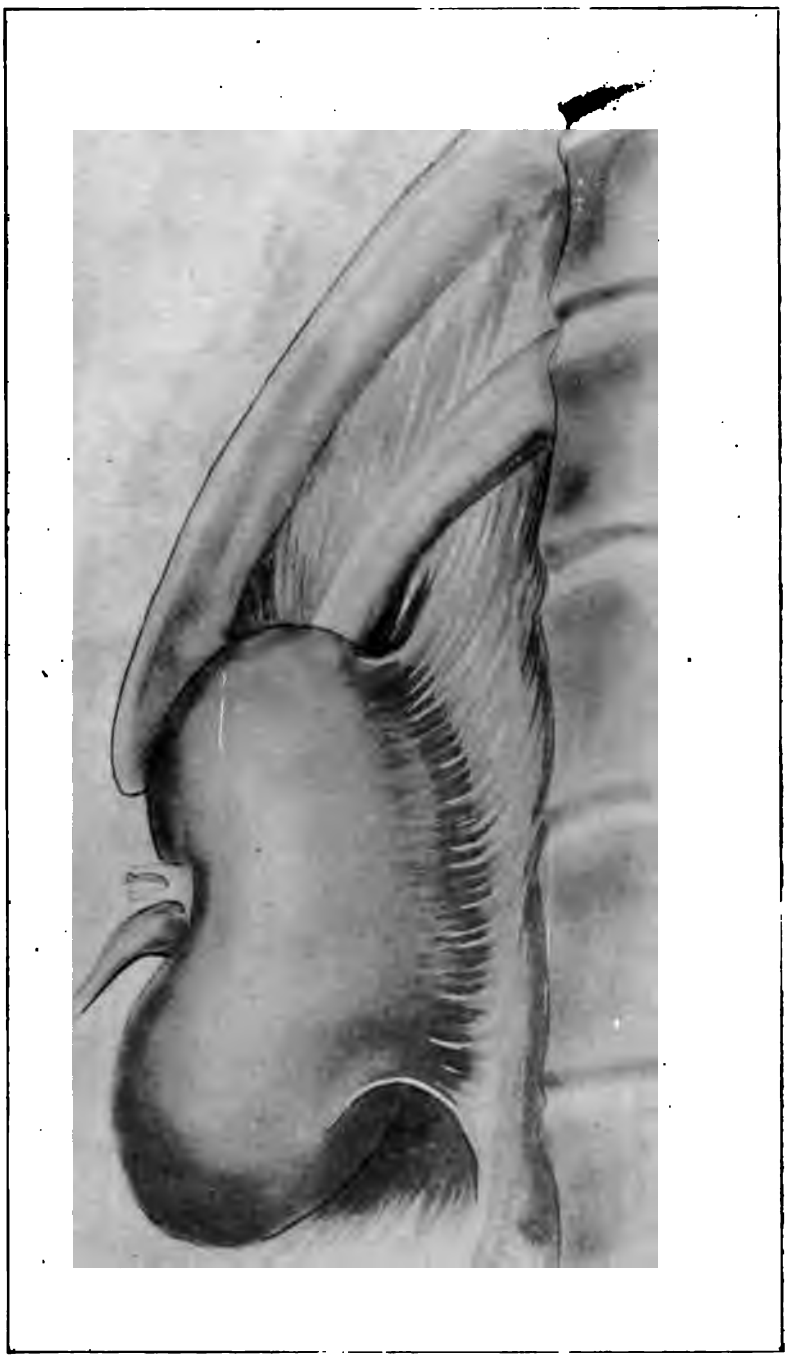


Fig. 133. Local results of fixation. (C. Garré).

quadratus lumborum and sacro-lumbalis, the lateral four through the transversalis fascia and latisimus dorsi muscles. Greater firmness is given to these suspension sutures by including the adjoining fatty capsule. Muscles and fascia are closed by sutures, and the loose loop threads made taut and tied over them. The skin wound is then closed.

Rest in bed is necessary for three weeks, the first two of which the patient must lie on the back.

Some operators prefer the oblique or the transverse incision, but it offers no special advantage, except to afford a larger space. The method of anchoring the organ has also been modified in various ways. Some surgeons leave the capsula propria intact and place the suspending sutures in the kidney parenchyma; others between the intact capsule and the parenchyma. The shape of the capsule incision has also been subjected to changes.

Modifications

It seems that the combination of decapsulation with fixation has a more reasonable basis because a firmer union may be expected by the apposition of raw surfaces, and because the decapsulation undoubtedly exerts a beneficial influence on the congested condition in the parenchyma so frequently associated with the disorder.

The ultimate results of nephropexy, if properly performed, will usually be permanent and satisfactory.

In doing the operation one should be aware of the coincidence of a movable kidney and chronic appendicitis in more than fifty per cent. of all cases in the female sex; and of the casual complication with gall-stones, which conditions should be attended to at the time the kidney is anchored.

Chronic Appendicitis Gallstones

Far-advanced, structural changes like pyone-

Nephrectomy

phrosis, cystic degeneration, tuberculosis, malignant growths, or atrophy call for nephrectomy.

PYELITIS AND PYELONEPHRITIS.

Prophylaxis

In the way of prophylaxis much can be done to prevent this serious trouble—serious because of the grave consequences with respect to the functional integrity of the kidney; and because of the oftentimes irreparable essential lesions.

The avenues of the infection being pretty well known, we are, therefore, in a position to reduce this chance to the lowest possible minimum; or if the infection has occurred, to check it by suitable measures directed toward the primary cause. In this regard we must remember that even superficial epithelial lesions of the urethra and bladder, caused by traumatism, open the gate for bacteria which, via the circulation, are carried to the kidney. Or the infection may be imported from a more or less remote focus. Attention may be called in this connection to the relation between suppurating parotitis, carbuncle, or a tonsillar abscess and a pyelonephritis (hematogenous infection.) If, therefore, in any of these conditions the febrile and other morbid conditions appear unduly prolonged, the urine should be carefully examined.

Metastatic Infection

Ascending Infection

On the other hand, the infection may travel directly from the bladder through the ureter into the renal pelvis (urogenous infection). This kind of infection is enhanced by urine retention which accompanies urethral stricture, prostatic hypertrophy, and paresis of the bladder; furthermore, by inflammation of the bladder, vesical tumors, and vesical calculus.

We should use all possible antiseptic precautions and the utmost delicacy when employing instruments in the urinary tract so as to prevent even the smallest epithelial abrasions, and sub-

sequent infection. Urine retention must be relieved in the proper manner; and an inflammatory or suppurating process in the pelvis or over the psoas muscle should be removed.

Rest, Heat, Milk Diet and Diuresis

Acute pyelitis and pyelonephritis requires rest in bed, hot packs, a strict milk diet, care of the bowels, and the ingestion of much water, especially spring water having diuretic qualities.

Opiates and Antipyretics

For the pain opium-belladonna suppositories, or hypodermic injections of codeine, are indicated. For excessive temperature, antipyrin is given. From the beginning, 1.0 (fifteen grains) of urotropin should be administered three times a day. If the fever does not abate and if chills persist, it may become necessary to expose the kidney by a lumbar incision and establish free drainage by splitting it down to the renal pelvis. Sometimes a large abscess will be found, sometimes many miliary ones, or a retention of pus in the renal pelvis caused by a blocking of the ureter. If the latter condition can be positively diagnosed an attempt should be made to pass a ureter catheter *per vias naturales* into the pelvis, and evacuate the pus by irrigation with antiseptic solutions. As a palliative measure this method has been successfully performed by the author many times; but with curative results only in a few cases of ascending gonorrheal infection.

Urotropin

Nephrotomy

Pelveo-Renal Lavage

The treatment of *chronic pyelitis and pyelonephritis* is almost identical with that of the acute form, except that the patient, if his physical condition permits, may be allowed to be up and around, but he should avoid exposure to cold, violent exercise, or attacks of indigestion.

Non-irritating diuretics are serviceable, among them a decoction of flor tiliæ, of which he may drink a quart or more a day, or

℞

Potass. citr.,	8.0 gm. (ʒii)
Infus. buchu,	180.0 gm. (ʒvi)

M.

S. Two tablespoonfuls three to four times a day.

or

℞

Potass. acet.,	12.0 gm. (ʒiii)
Aqu. petroselin,	150.0 gm. (ʒv)
Syr. spl.,	30.0 gm. (ʒi)

M.

S. A tablespoonful every two hours.

Technique of Pelveo-Renal Lavage

In the ascending type renal lavage may be tried. This is performed by injecting medicated fluids into the renal pelvis through a ureter catheter introduced by means of a cystoscope. The direct or indirect view catheterizing cystoscope may be employed. In the male the direct-view cystoscope no doubt causes more tension and traumatism to the prostatic urethra than the indirect-view instrument. The former, also, will be found inadequate where the ureteral os, as quite frequently happens, is located close to the vesical sphincter. On the other hand, I admit that the passing of the catheter into the ureter is more readily accomplished with the direct-view cystoscope, for here the curve from the instrument to the ureteral os is eliminated.

For the purpose in question a cystoscope should be employed which can be removed without disturbing the position of the catheter in the renal pelvis. The catheters used should have moderately blunt points, should be of larger caliber than usually employed and should be introduced without undue haste in order to avoid traumatism.

The author's direct view cystoscope approaches

these requirements as nearly as possible. Every part can be separately sterilized. Owing to its larger caliber (26 Fr.) one and eventually two

Fig. 134. Author's catheter cystoscope.

large sized catheters may be introduced without difficulty.

Author's Cystoscope

Of late the caliber of cystoscopes has been reduced to a degree considerably below the one maintained for years. This was only possible by sacrificing a part of the previous superior optic and the caliber of the urethral catheters, and owes its inceptions to the erroneaus idea that a small caliber instrument will cause less pain than one of a larger size. Against this fallacy I submit the following facts.

No pain is experienced in a normal urethra if a sound below 30 Fr. is passed through it with dexterity and gentleness. In an inflamed urethra the passing of a small sized, even of a filiform, bougie produces pain. If a small sized bougie is left in a sensitive urethra for a few minutes, the subsequent introduction of a much larger instrument will be hardly noticed by the patient.

If a stricture of a caliber which is smaller than that of the cystoscope interferes with the introduction of the latter it is the better policy to dilate the stricture than to impair the usefulness of the instrument.

Cystoscopes of Large Caliber More Suitable

In order to be useful for diagnostic and, still more, for therapeutic purposes, the lumen of the catheter should be sufficiently large to permit a rapid flow of urine and of medicinal fluids, and also allow good drainage for the oftentimes thick pus and débris in the renal pelvis. The caliber of such catheters should not be less than 8 Fr., which scale cannot be employed through a cystoscope of a caliber of less than 26 Fr. without reducing the efficiency of the optical part.

Renal lavage, if carried out carefully, and under strictly antiseptic precautions in every detail, is a harmless procedure.

Medicines Employed for Lavage

The medicaments commonly employed are a warm solution of boric acid, 4 to 100; oxycyanide of mercury, 1:4000; nitrate of silver, 1 to 2000

to 1 to 1000; protargol one per cent, and argyrol five to twenty per cent. Of the silver solutions mild preparations should be used at first, gradually increasing their strength from treatment to treatment.

Quantity and Strength of Solutions

The quantity to be injected must vary with the capacity of the renal pelvis in each individual case. If the renal pelvis be of approximately normal size we employ instillations with stronger solutions; if it be much dilated injections with larger quantities of dilute fluids are required. However, there should never be injected such an amount as to cause over-distention and colicky pains. In the majority of cases, I have found injections of from four to eight cc. at a time sufficient.

The intervals that should elapse between each application depend on the nature and the extent of the local trouble. If there is much débris in the renal pelvis it will be necessary to perform preliminary irrigation with a warm boric acid solution until the fluid returns fairly clear, and then to inject the antiseptic, while in cases with little pus in the urine the antiseptic may be deposited at once without a preceding cleansing irrigation.

Continuous Catheter

When the conditions require daily renal lavage in male patients, the author prefers leaving the catheter *in situ* for a few days at least; this permits frequent topical applications without unnecessary and inevitable traumatism to the prostatic urethra incident to repeated introductions of the instrument.

Usefulness Limited

The extravagant claims which have been made for this method of treatment are not supported by facts, but it certainly has a definite, though limited, sphere of usefulness. To appreciate this the following points may be considered.

Etiologically pyelitis, or rather pyelonephritis, is more frequently caused by a descending, or hematogenous, than by an ascending, or urogenous, infection. If the suppuration be of hematogenous origin the kidney parenchyma must have been first infected, and it is difficult to understand how a topical application to the renal pelvis can effectively reach the focus in the kidney proper. And the same objection must reasonably be made to the efficacy of the method in the ascending type of chronic pyelonephritis. At best one can expect some relief of those symptoms which are due to the abnormal conditions in the renal pelvis and are directly traceable to the infectious inflammation existing in that locality as, e. g., retention of pus and urine arising from inflammatory swelling or blocking of the ureteral openings, renal colic from distention of the pelvis, and fever.

Suppurative pyelitis without involvement of the kidney proper constitutes but a small fraction of the cases of pyelitis that come under observation; this is partially explained by the generally accepted fact that the hematogenous infection is the more common cause of pyelitis than the urogenous infection; perhaps, also, by the absence, or the mildness, of perceptible symptoms in the initial stages of the disease that render its early discovery rare. This latter fact also explains why we do not often see cases of the ascending type before the kidney parenchyma has become invaded.

Complications

Another point to be considered is that many of these cases either are caused by, or complicated with, calculus, malformations of the renal pelvis, strictures or other obstructions in the ureter and urethra, tuberculosis, tumors, etc., so that renal lavage can, at most, give only temporary relief, while suitable and well-directed surgical measures will usually obviate the necessity of any topical applications.

Furthermore, the majority of uncomplicated cases of acute pyelitis heal spontaneously, or under the use of the internal agents discussed in previous paragraphs of this section. Almost the only exceptions to this rule are ascending staphylococcus and gonorrheal infections of the renal pelvis. These cases are not so rare as is commonly believed, and they do not yield to a medicinal treatment, while renal lavage, with efficient silver solutions, has generally given surprisingly good and rapid results. Frequently, however, especially in older cases, the gonococcus appears associated with bacterium coli, staphylococcus, and other germs. If properly treated the gonococcus in such cases disappears permanently from the renal pelvis, but I have never succeeded in a single case of this kind in clearing the urine thoroughly or permanently of the other bacteria. This justifies the conclusion that renal lavage is not effective in mixed infections of the pelvis, or else that the gonococcus has a tendency to locate in the pelvis while the other bacteria invade the kidney where topical applications do not reach them.

Summing up our experience with renal lavage in many cases of divers types of pyelitis and pyelonephritis, it may be stated that, in select cases, it is a curative agent in pyelitis uncomplicated by renal infection, stones or ureteral strictures, and then only to be tried when the ordinary means of internal medication, etc., fail to remove the suppuration. It should always be employed in gonorrheal pyelitis.

Indications for Pelveo-Renal Lavage

Many chronic cases extend over years without inconveniencing the patient very much or visibly impairing his general health; others lead sooner or later to abscess formation, and in extreme cases to so much destruction of the kidney paren-

chyma as to transform the organ into a large pus sac. In this event nephrotomy and nephrectomy, respectively, offer the only chance for a cure, or, at least, relief.

Nephrectomy

If the latter operation be decided upon one should make sure of the presence of another kidney, and of its functional integrity. It is not absolutely necessary that the other kidney be essentially normal, and we oftentimes see these lesions, when due to the toxic influence of its diseased mate, improve and even disappear with the removal of the latter. If, however, these toxic lesions be severe ones nephrotomy and drainage is indicated. Under favorable circumstances it is possible by the latter procedure and repair of eventual lesions of the ureter, to restore a suppurating kidney to good functional activity and apparently normal structural conditions. Here we also observe the beneficial effect on its mate and may, if circumstances demand, perform secondary nephrectomy. It may be stated that the latter operation is then rendered more difficult on account of dense adhesions.

Nephrotomy

PARANEPHRITIS (SUPPURATING PERINEPHRITIS).

Suppurating perinephritis is a very serious disorder owing to its etiology, the difficulty of its early recognition, and the tendency to implicate adjacent structures, especially the pleura and lungs. Most of the symptoms which have been theoretically considered as pathognomonic of perinephritic phlegmon are also found in other disorders as typhoid, malaria and pleurisy. In fact these symptoms may be so pronounced as to divert the attention of the physician for a long time, until the appearance of the perinephritic abscess in the lumbar region or in the groin makes the diagnostic error apparent or clears away all uncertainty.

Trauma

A trauma preceding the disease may facilitate the diagnosis of kidney lesions; and a knowledge of the previous existence of kidney lesions will assist in an early diagnosis, for instance pyelitis, pyelonephritis, tuberculosis and renal calculus which may transmit infection to the adipose capsule by continuity or by way of the blood and lymph vessels.

Pyelitis

Renal Calculus

But in the presence of general symptoms, or those referred to parts distant from the lumbar region, one is likely to forget the possibility of a perinephritis and phlegmon consecutive to a general or localized infectious process like influenza, typhoid, malaria, smallpox or carbuncle. There are, however, two early symptoms possessing more significance than those which the disorder has in common with other deep-seated suppurations, viz.,

Character of Pain

1. The peculiar character of the pain in the iliocostal space, particularly pronounced upon palpation in the spinocostal angle.

Attitude of Patient

2. The peculiar lameness and lateral inclination of the trunk, due to flexion of the thigh of the affected side, a position assumed by the patient to relieve the pressure upon the inflamed tissue. This flexion becomes more pronounced when the suppuration extends downward along the psoas muscle, and when the patient is lying on the back.

Similarity with Symptoms of Lumbago

The frequency with which perinephritic inflammation, especially in the earliest or in the chronic stage, is mistaken for lumbago makes it necessary to point out that lumbago causing a similar attitude is not accompanied by fever, pain on pressure in the lumbar region, or a visible or palpable swelling.

Absorbent Measures

In uncomplicated primary perinephritis measures are justified which are likely to check suppuration and promote absorption of inflammatory

products. But as soon as the diagnosis is established with certainty by a palpable fluctuation,

Surgical Relief

or when, in the absence of the latter, pus is suspected from the other more or less convincing symptoms, an incision in the loin should be made without delay in order to evacuate the pus. In this event the kidney must be carefully examined, not so much for possible damage to the organ which might have occurred by the capsule phlegmon, as for renal lesions which may have caused the perinephritic abscess. Such lesions must be properly treated in order to prevent a recurrence of the suppuration. If a stubborn fistula remains and its connection with the kidney is ascertained, nephrectomy may become necessary.

RENAL CALCULI.

Medical Treatment

The medical treatment of nephrolithiasis should concern itself, first, with guarding against the formation of renal calculus in cases that are so predisposed; second, with the removal of deposits of renal sand and gravel of small size; and, third with symptomatically relieving the pain of a renal colic that has developed, and with controlling the hematuria associated with the disorder.

Prophylactic measures vary somewhat according to the composition of the urine. To prevent uric acid or urate deposits the solubility of the urinary acid must be increased by abundant ingestion of water, and alkalies administered,

Prophylaxis

which, while certainly not possessing the power of dissolving urate concretions, act prophylactically by increasing the solubility of the circulating acid and by promoting oxidation. Nothing may be expected from lysidin, piperazin, urotropin and other so-called "specifics," and there is noth-

Mineral Waters

ing yet known that will dissolve a uric acid concretion. Of mineral waters enjoying the distinc-

tion of having such solvent qualities I mention the springs of Vichy, Karlsbad, and Wildungen. It being an established fact that alkaline urates are more soluble than acid urates or uric acid, it can be easily understood how the sodium carbonate and bicarbonate contained in these waters render the urine less acid, thus making them valuable in the prophylactic treatment.

Diet The diet should not be rich, but a moderate amount of meat may be permitted. The administration of food containing a high percentage of nuclein or extractives should be reduced. Therefore, all internal organs (liver, kidney, sweetbreads and brain) should be excluded, also, tea, coffee and cocoa. The use of alcohol is considered bad; however, there is no objection to a moderate amount of light Moselle or Rhine wine, or whiskey of course, well diluted.

Alcohol

Medication and diet in nephrolithiasis oxalurica is similar to that of nephrolithiasis urica. Instead of the previously mentioned mineral waters, plain or carbonated water is preferable.

Of the diet such articles should be excluded or greatly reduced, as contain preformed oxalic acid. for instance, tea, cocoa, coffee, chocolate, spinach, sorel, red beets, tomatoes.

Phosphatic concretions are most common in purulent disorders of the kidney and renal pelvis, with an alkaline urine. The latter should, therefore, be rendered acid and aseptic; its stagnation prevented, and an existing pyelitis treated accordingly. The diet should consist of carbohydrates and little meat, and the acidity of the urine, if possible, maintained, or restored, by mineral acids, especially hydrochloric acid and phosphoric acid.

Renal Colic For the relief of pain in nephrolithiasis, and in renal colic, hot or cold applications to the lum-

bar region are useful. In the dull pain most common to large concretions heat is more satisfactory. In the acute paroxysms of pain in a renal colic, cold affords greater relief. In the latter case, however, we must employ morphine or opium, and it will be necessary to use larger doses than is customary elsewhere in order to obtain the same results. Morphine may be injected hypodermically in doses of 0.01 to 0.03 ctgr. Opium extract, 0.03 to 0.06 ctgm., may be administered in a suppository combined with 0.01 ctgm. of belladonna extract.

Heat

Ice Bag

Opiates

Glycerine

Sometimes the passage of renal sand is aided by the administration of glycerine, which is recommended by Herman in doses of 50 to 100 cc. in 30 to 40 cc. of lemonade or syrup. It is given once or twice a week and seems to possess real merit. The urine, however, should be watched during its administration, as it sometimes causes hematuria, in which event it should be discontinued.

Hematuria

Patients with renal hematuria are to be kept in bed. The bowels should be thoroughly evacuated, and, if possible, a strict milk diet given. If the hemorrhage is due to traumatism by the stone this will usually suffice. If due to congestion of the renal parenchyma, and if it should be impossible to check the bleeding by these measures, a hypodermic injection of ergotin will be useful:

Rest

Ergot

℞

Fluid extract of ergot,	1 part
Camphor water,	2 parts

M.

Of which ten to fifteen drops are to be injected.

With the treatment outlined above patients can be kept comfortable for some time.

Indications for Surgical Relief

Operative treatment is indicated if the above

named dietetic and medicinal measures fail; if recurring attacks of pain and hemorrhage undermine the patient's health; if pyelitis and pyelonephritis complicate the disorder; or if the ureter is blocked by a calculus. In these events the patient's life becomes endangered by mechanical anuria or by reflex anuria of the other kidney; by pressure upon the organ in aseptic cases; and by pyonephrosis or renal abscess in septic cases. The possibility of infection of the second healthy kidney by a septic process involving its mate, and the danger of an uncontrollable hemorrhage caused by erosion of a large renal vessel, also deserve due consideration.

Anuria

Anuria can be relieved by ureter catheterization if it is caused by an impacted stone or by reflex spasm of the healthy ureter, and this method should be tried before more radical operative steps are undertaken in such a case, since the results are unquestionably better when the anuria has been relieved preceding an operation, that may afterwards be required.

Catheterization of the Ureters

The typical operation for renal calculus is nephrolithotomy, or pyelolithotomy. Nephrolithotomy is the operation for stone in the kidney parenchyma; pyelolithotomy, for stone in the renal pelvis without cutting through the renal parenchyma. Either of the two methods is a conservative surgical procedure destined and capable of preventing the destruction of the kidney, which is bound to be the ultimate result of the presence and growth of a calculus.

Anesthesia

The operation can be performed under general or spinal anesthesia. The kidney is freed from its attachments, the parenchyma or the pelvis, as the case may be, incised, the stone removed, and the wound closed if it is an aseptic case. Should the urine be alkaline, or should suppuration be

present, the kidney or pelvis is not closed, but packed with gauze and left open for subsequent antiseptic applications.

Danger of Iodoform and Other Antiseptics

Iodoform gauze should not be used in a kidney wound on account of the danger of a rapidly developing intoxication. The same rule applies to bichloride of mercury and other toxic antiseptics.

Nephrectomy should only be performed when a good deal of the kidney parenchyma is destroyed, and the other kidney is found to be functionally intact. If both kidneys are involved, nephrotomy is the operation of choice, and should be performed on each kidney at different times.

Mortality

The mortality after nephrotomy is less than three per cent. It would be still lower if the operation were done in the early stages, and if beforehand the functional renal capacity were ascertained by cryoscopy of the blood and urine, and by a thorough examination of the excreted total solids in a series of examinations.

Cryoscopy

Radiography

With the present improved technique of radiography this method can be relied upon under all circumstances and should be employed in every case of nephrolithiasis. It should be extended to both kidneys and also to the ureter, because it may disclose a stone which may be located in the other kidney, or calculi lodged in the ureter. The value of such preoperative information can not be overrated. It may prevent the removal of a suppurating yet still functionating calculous kidney, on account of the impending danger of anuria of the remaining mate, it may also prevent a subsequent renal fistula due to blocking of the ureter by calculi in its lumen. Fig. 135 illustrates a case of the author in which the functional test showed all values higher on the side of the calculous kidney which was known to be infected, while its mate furnished clear and normal urine.

The diseased kidney was therefore not removed after delivering the stone but drained. In the following forty-eight hours all urine came through the wound, but none was secreted into the bladder from the apparently healthy kidney.

When removing the stone by pyelolithotomy

Fig. 135. Author's case. Actual size of renal calculus.

the renal pelvis should be opened on its posterior aspect, because of the danger of injuring the large vessels when incising the anterior part. By not extending the posterior incision into the parenchyma troublesome hemorrhage can be avoided. The wound in the renal pelvis may be closed by catgut sutures if no infection be present, otherwise it is left open and drained.

TUMORS OF THE KIDNEY.

Treatment Unsatisfactory

The ultimate results of the treatment of kidney tumors, which, of course, can only be an operative one, are still very unsatisfactory. The cause of this lies in the difficulty of an early diagnosis. Many tumors exist in a state of latency without any manifest symptoms up to a period when metastasis in other organs draws attention. In others, the symptoms are similar or identical with those of other kidney lesions, like renal calculus, tuberculosis, or syphilis, and it is not always possible by palpation to discover or identify the swelling as due to a new growth. If the tumor involves the parenchyma, cryoscopy and functional examination is of some value, but this test will be negative if the tumor belongs to the fatty capsule, or to the adrenal gland.

Symptomatic Varicocele

In tumors of the left kidney some significance can be attached to a suddenly appearing varicocele on the same side. This is due to an interference with the return flow of blood in the spermatic vein, which, on this side, empties into the renal vein at a right angle. However, this is not positive proof, as other conditions—syphilitic or tubercular glands—produce the same symptoms. This symptomatic varicocele remains unchanged when the patient is put in the recumbent posture, while an ordinary varicocele disappears under these conditions.

In doubtful, but yet suspicious, cases an exploratory incision may be justified, and if the true nature of the trouble is recognized nephrectomy is the operation to choose, provided it promises full recovery, or at least a prolongation of life. If the examination demonstrates extensive metastases, or thrombosis of large vessels, the operation is useless. The streptococcus treatment and the employment of the X rays to cure the disease have been signal failures.

RENAL TUBERCULOSIS.

Diet and Hygiene

By suitable dietetic and hygienic measures, and by internal medication carried out on the same principles as those governing the treatment of tuberculosis elsewhere, it is usually possible to keep up the general nutrition of the patient, to fortify his resisting powers, and to effect a symptomatic improvement. Of value is the rest cure in a dry, bracing climate, such as Heluan, in Egypt, or Colorado and Arizona in this country.

Ichthyol and Creosotal

Among the internal remedies ichthyol and creosotal are the most popular and, perhaps, the most useful. It cannot be said that they exert any specific anti-bacterial influence in tuberculosis, but following their administration the appetite increases and an improvement in the general nutrition and strength of the patient can be observed. The fever subsides and the annoying vesical symptoms are more or less relieved. Creosotal, a derivative of creosote, being devoid of the irritating and toxic qualities of the latter, is given in milk or water in doses of fifteen to forty-five drops three times a day. The dose of ichthyol is the same.

Surgical Treatment

Nephrectomy Indications

A cure of tuberculous kidney, if at all, can only be expected by nephrectomy. The operation is indicated in unilateral renal tuberculosis, provided the opposite kidney is functionally intact, and not the seat of tuberculosis or some other advanced disease. Sometimes, however, improvement of mild tuberculous lesions in the opposite kidney may be observed after removal of its badly disorganized mate.

Contra-indications

Nephrectomy is not indicated in the presence of miliary tuberculosis in other organs, but milder tuberculous lesions in the bladder, prostate and epididymis, and even in the lungs, are very favorably influenced by nephrectomy, and some-

times heal without further local treatment. The operation might be urgently required in uncontrollable hemorrhage from the diseased kidney; secondly, in recurring attacks of renal colic which, together with the necessarily large quantities of opiates, undermine the patient's strength; and, thirdly, when serious septic symptoms denote suppuration of the kidney parenchyma, or of the paranephric tissues. The tuberculous kidney should be removed by the extraperitoneal lumbar route. Most practical is an oblique incision beginning at the extremity of the twelfth rib and terminating at the junction of the middle and external third of Poupart's ligament. This incision permits free access to the kidney and exposes the major part of the ureter. In all cases of nephrectomy in this disorder the ureter should be exposed and examined, and if found diseased it must be resected as far down as it be found thickened and diseased. It is a mistake to ligate it close to the renal pelvis and leave it behind, which may become the cause of post-operative complications such as prolonged suppuration, fistula, retroperitoneal and even general miliary tuberculosis. Various methods are employed to avoid these results, among them the inversion of the stump and closure by sutures; the severing of the ureter with the thermocautery between two ligatures; the cauterizing of the ureteral canal for a distance of an inch with a fine Paquelin burner and finally the eventration of the stump end.

Lumbar Route

Care for Ureter

Inversion of Stump

Thermocautery

Where nephrectomy cannot be performed, nephrotomy, as a palliative operation, is indicated, whereby free drainage is established, the fever reduced, and the general condition of the patient improved, sometimes so much so that a secondary nephrectomy may be successfully performed after a while.

Nephrotomy

The results of nephrectomy for renal tuberculosis have shown a decided improvement within the last ten years over those before this period. This is not so much due to a more perfect technique as to a more exact and early diagnosis, and to the very reliable information of the condition and functional capacity of the opposite kidney obtainable by cryoscopy, and urine segregation.

Importance of Early Diagnosis

The diagnosis is very difficult and requires an exact knowledge of the various characteristic symptoms peculiar to this disorder. Yet there are cases in which most of these symptoms are absent in the early stage, and the diagnosis therefore must be made by exclusion. Two symptoms, however, are very constant in this stage of the disease, viz., vesical irritation and a slight elevation of the evening temperature. In the later stage the constancy of pus in the urine, and its acidity in spite of the presence of urea-decomposing germs, are significant of tuberculosis. In a doubtful case the inoculation of a guinea pig gives positive information.

Inoculation Test

When ulcerations of the ureter have terminated in its complete obliteration the urine obtained from the bladder might be perfectly clear and normal. Only by exploring both ureters can this condition be discovered.

Cystoscopy

The determination of the functional capacity of the kidney is accomplished by cryoscopy of the urine and the blood; by the test of the permeability of the renal parenchyma; and by the renal glycosuria produced by phloridzin.

Cryoscopy and Its Principles

Cryoscopy (the determination of the freezing point of the urine and blood) is based on the fact that the freezing point of a solution is lower in proportion to its concentration; i. e., to the number of molecules it contains.

Applied to a test of the eliminating power of

the kidney the method takes into consideration all the solids of the urine excreted in a given time from each kidney separately. If the kidney is diseased the molicular concentration of the urine, and consequently the freezing point, is lowered, due to the retention of urinary solids in the system, and, therefore, the freezing point of the blood will be equally higher than normal. This is especially pronounced in bilateral renal diseases. The method, however, requires great care and special skill in order to obtain accurate results.

The Freezing Point

Information about the permeability of the kidney can be obtained by hypodermic injection into the tissues of different non-toxic substances which ultimately are eliminated in the urine without previously undergoing disassimilation in their passage through the organism. Such substances are methylene blue and indigo-carmine. From the length of time between the incorporation of the substances and their appearance in the urine; from the duration of their elimination and the degree of discoloration of the urine; certain conclusions regarding the physical condition of the kidney may be drawn.

Elimination Test

While this test is not absolutely reliable it is of value in interstitial nephritis, and permits deductions by comparing the urine obtained simultaneously from both kidneys by catheterization. Of the methylene blue 4 c. c. of a one-half per cent. solution is injected; of the indigo-carmine 4 c. c. of a four per cent. solution.

Phloridzin Test

The chemical function of the kidney can be tested by producing renal glycosuria through the injection of phloridzin. The sugar which appears in the urine is not a blood product but it is elaborated by the renal epithelium from other blood

constituents. Under normal conditions the same amount of sugar is artificially produced by both kidneys. It takes from fifteen to thirty minutes for the sugar to appear in the urine; the whole phenomenon is finished within three hours. Phloridzin, 0.005 (one-tenth grain), in one c. c. of distilled water, is injected hyperdermically. If the secreting parenchyma is reduced or entirely destroyed the elimination will be retarded or completely inhibited. Here, as in the preceding test, only comparative values have any significance, and therefore the urine must be obtained simultaneously from both kidneys.

None of these tests when considered separately yield definite conclusions, but the results of all three, taken together with the quantitative determination of the urea, may be relied upon if the results of all of them point to normal or to impaired functional renal activity. By none of these tests, however, can be obtained a positive assurance that whatever activity exists will be maintained after an operation.

For more detailed information concerning this subject, the reader is referred to Casper-Richter's monograph on *Functional Diagnosis of Kidney Diseases,* A. C. Croftan's *Clinical Urinology,* and Kuemmel's *Cryoscopy of the Blood and Urine.*

CYSTONEPHROSIS.

(*Hydronephrosis. Pyonephrosis. Hematonephrosis.*)

Considering the etiology of the disease, it is but natural to expect that by a well-directed prophylaxis the condition can often be avoided; therefore, anything causing vesical retention, or a backing-up of the urine into the renal pelvis, should be promptly attended to. Such causative

Prophylaxis

factors are found in phimosis, strictures, prostatic obstruction, paresis of the bladder, partial or complete obstruction of the ureter by stones, strictures, valves and bands of the ureter; or from without by pathological conditions of neighboring organs. A very frequent cause is dislocation of the kidney, abnormal insertion of the ureter in the renal pelvis, and pyelitis.

Movable Kidney

Infection is likely to occur in hydronephrosis and should, by all means, be prevented by a strict asepsis in instrumentation in any part of the urinary tract, and by the liberal internal administration of urinary antiseptics.

Pyonephrosis—suppuration in a hydronephrotic sac—is also likely to be hematogenetic, and rapid destruction of the parenchyma will be the result. But, even without a supervening infection, destruction of the secreting renal tissue by pressure-atrophy is inevitable. The probability of rupture of the sac, with its dangerous consequences, should be remembered.

Ureter Catheterization a Palliative Measure

In intermittent hydronephrosis the retention can be temporarily relieved by the ureter catheter, but this is no more than a palliative measure which cannot be continued indefinitely.

Radical relief may be expected from nephrotomy, pyelotomy, or nephrectomy, as the situation may demand. If a prolapsed kidney is the cause, nephropexy may bring about a cure; again, valves or strictures of the ureter may be divided; and an abnormal insertion of the ureter, or malformation of the renal pelvis, may be corrected by a plastic operation.

Surgical Relief

Nephrotomy and opening of the cyst, with a subsequent fistula; or pyelostomy, are the operations of choice,—

Indications

(1) When the opposite kidney shows functional defects, and the diseased kidney still possesses some secreting material;

(2) In horseshoe kidney; and
(3) In bilateral cystonephrosis.

Two kidneys being present, one functionally intact the other having no, or very little, secreting parenchyma, nephrectomy may then be performed, as in this way a troublesome fistula is avoided, and because a subsequent nephrectomy is a rather difficult operation on account of adhesions forming between the kidney and the adjacent tissues—diaphragm, colon, etc.

Johnson's Method of Combining Radiography and Catheterization of the Ureters

Before performing nephrectomy one should always be sure of the presence of another kidney and the absence of a congenital malformation (like a horseshoe) or a double kidney. This can be accomplished by combining the catheterization of the ureters with radiography, a method devised and published by A. B. Johnson, of New York, in 1900. A flexible lead stiletto inclosed in a ureter-catheter is passed into the ureter and its location brought into plain view by a radiogram. Such graphic information is of incalculable value considering the possible error when cystoscopically two ureteral openings are seen, which, however, correspond to two ureters leading to one kidney.

SYPHILIS OF THE KIDNEY.

If syphilis of the kidney be recognized a specific treatment should be tried. This failing, nephrectomy is indicated, provided the other kidney is functionally intact. The extirpated kidney will usually be found to be the seat of a very large or many small gummata associated with an extensive interstitial nephritis. Sometimes the kidney is so much enlarged as to simulate a tumor.

The history of the case and evidence of hereditary lues or other specific lesions, as well as a

tentative specific treatment, should be of service in making a correct diagnosis.

After nephrectomy has been performed a specific treatment should be instituted.

ACTINOMYCOSIS.

This is of quite rare occurrence and the diagnosis is hardly possible unless other focci are discoverable, or the presence of the actinomyces can be demonstrated in the urine, or in the secretion from a fistula that has formed.

ECHINOCOCCUS OF THE KIDNEY.

Unless the contents of the echinococcus cyst rupture into the renal pelvis and appear in the urine in their characteristic form, a diagnosis is quite impossible.

The disorder is readily mistaken for a renal tumor or hydronephrosis, and it is only to be recognized by an exploratory incision.

Depending on the seat and extent of the lesions we have the choice of opening of the sac, nephrotomy or nephrectomy. The latter can only be performed when the other kidney is functionally intact, which is determined by the methods discussed in the section on *Renal Tuberculosis.*

CHAPTER X.

THE TECHNIQUE OF NEPHROTOMY AND NEPHRECTOMY.

The technique of nephrotomy is subject to various modifications, depending on the purpose for which it is performed and the nature of the lesion.

Nephrotomy

The operation should be done extraperitoneally through the loin, indeed but very few cases of unusually large renal tumors, of injuries or floating kidney will compel us to take the transperitoneal route. To be sure the latter offers some inducement to the surgeon on account of the ready accessibility of the renal pedicle, but this advantage weighs little when compared with the ever present danger of peritoneal infection.

Lumbar Route Technique

For lumbar nephrotomy the patient should be placed upon the well side on a stout, round cushion between the last rib and the crest of ilium and the front of the body turned toward the table; or prone with the cushion underneath the abdomen. The first position—on the well side—is the customary one in the majority of operations on the kidney, with the exception of nephropexy for movable kidney, in short, it is applicable to any work on the kidney and the ureter.

Shape of Incision

Mostly *en vogue* are two modes of incising the tissues, viz., a vertical one along the outer border of the erector spinæ, and an oblique incision commencing just below the last rib, about two and a half to three inches from the spinous processes, passing downward and forward and terminating

just above the crest of the ilium, at any rate, far enough to provide sufficient space for the deep manipulations.

The skin, superficial fat and fascia, are divided and the outer border of the latissimus dorsi, together with the posterior border of the external oblique, exposed. After securing all bleeding points these muscles should be divided to the full extent of the superficial incision, which is then rapidly carried down through the internal oblique (readily recognized by the direction of its fibers) and through the aponeurosis of the transversalis, exposing the outer border of the quadratus lumborum, which if necessary may be divided. After ligating all bleeding vessels the lumbar fascia is cut through and the perirenal fatty capsule exposed. The latter held between two pair of forceps is divided with knife or scissors near its posterior portion in order to avoid injuring the colon or other adjoining parts contained in the peritoneal cavity. By this incision the kidney is brought into view and then the further steps taken, which vary in detail according to the nature of the trouble.

If it is desired to inspect the kidney surface or to explore the renal pelvis or the parenchyma by an incision, or to perform nephropexy, the fatty capsule should be stripped off the whole surface of the kidney. In the absence of perirenal inflammation this is readily accomplished with a gauze-sponge; while in other cases the adhesions require the use of scissors, the points of which should be directed towards the kidney.

If nephrotomy is performed for the relief of symptoms of passive congestion the fibrous capsule is divided along the entire length of the outer border of the kidney, and peeled off half way toward the pelvis upon either surface.

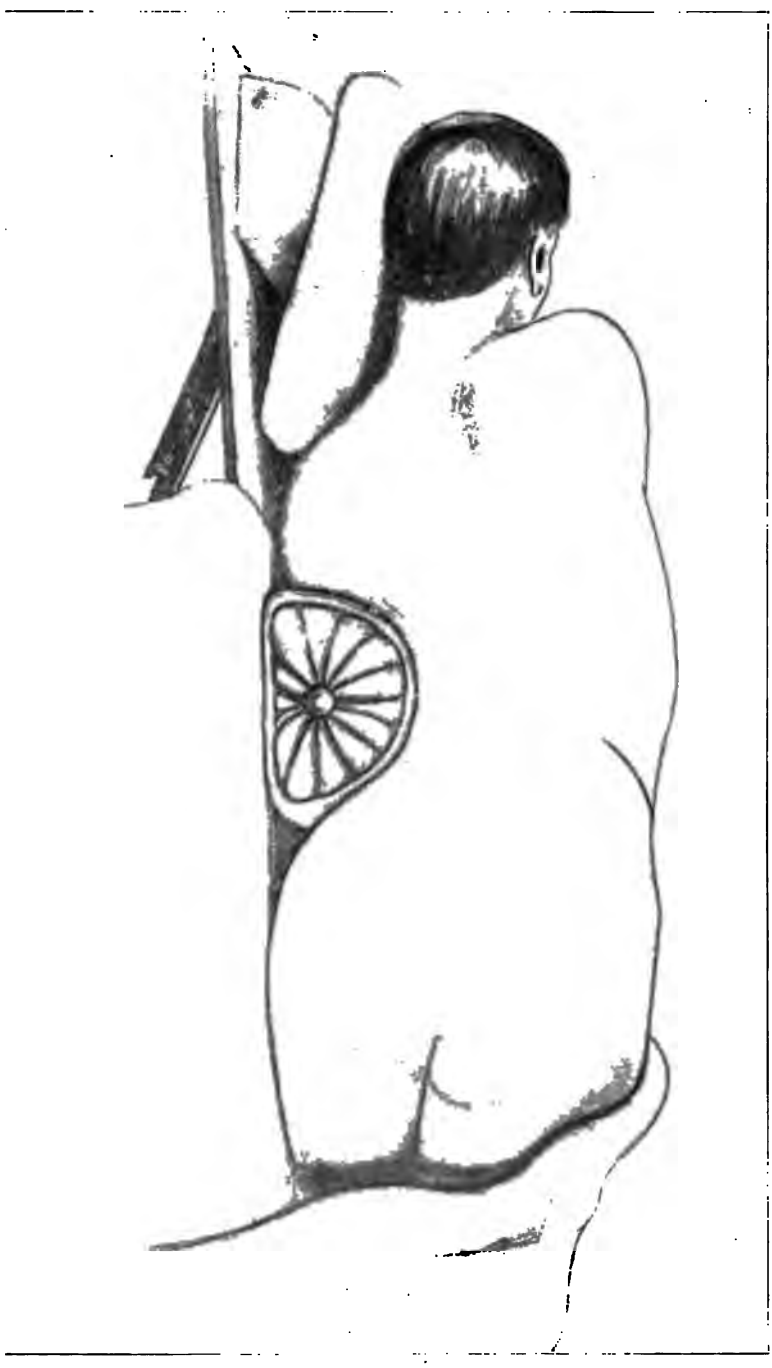


Fig. 136. Position of patient for nephrotomy or nephrectomy by the lumbar route

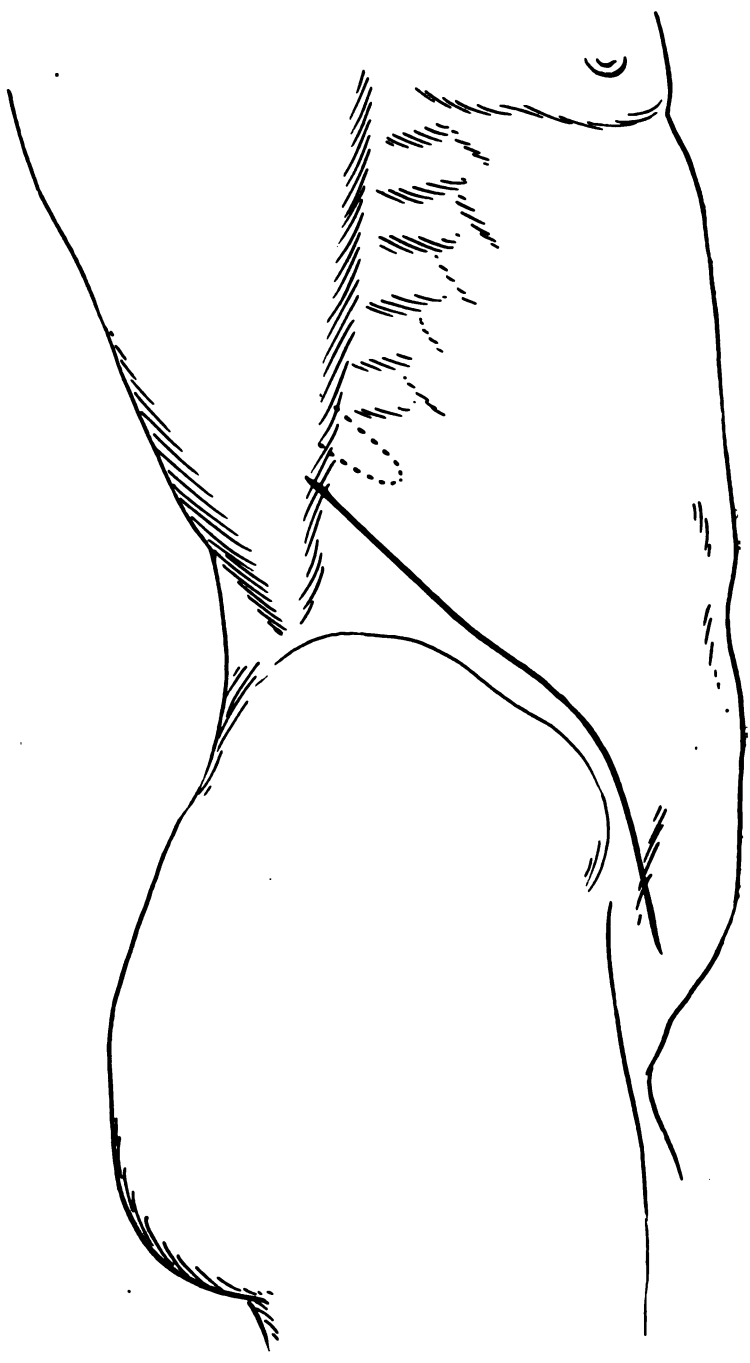


Fig. 137.

Eventually—as practised in decortication for nephritis—it is also resected.

Surgical Line of Incision

When the operation is done for exploratory purposes the kidney should be brought out on the loin, palpated between the fingers and thumb and, if so desired, incised about one centimeter backward from its anatomical, convex border. By selecting this line for the incision hemorrhage is reduced to a minimum. Profuse bleeding during

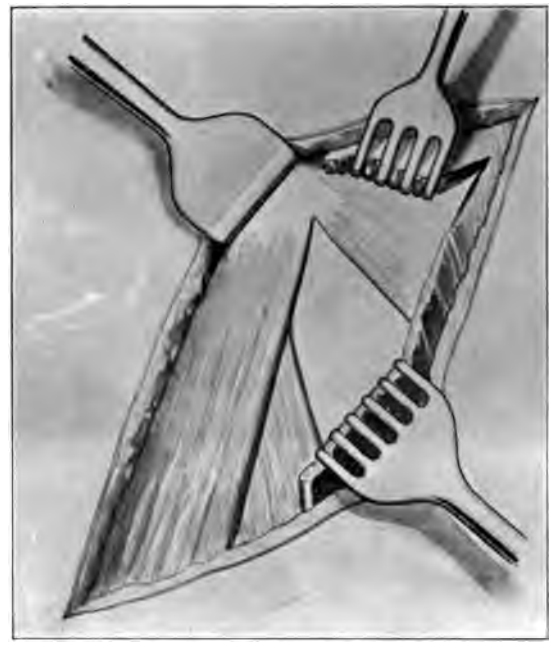


Fig. 138.

the exploration can be controlled by passing an elastic band around the vessels of the pedicle.

The same steps may be taken for the removal of a stone from the kidney or the renal pelvis, unless it should be desirable to remove the stone by incising the pelvis.

It is not always possible to deliver the kidney on the loin, either on account of dense perinephric adhesions or because the pedicle is

shortened by inflammatory conditions. By forcibly pulling upon such a pedicle the latter may be torn across, or even the vena cava injured. In these cases of a very short pedicle the author places gauze compresses under the kidney, which serve as a support and lift the organ somewhat out of the depth of the wound bed. The incision in the cortex may be closed by catgut sutures laid deep through the parenchyma, or by a few

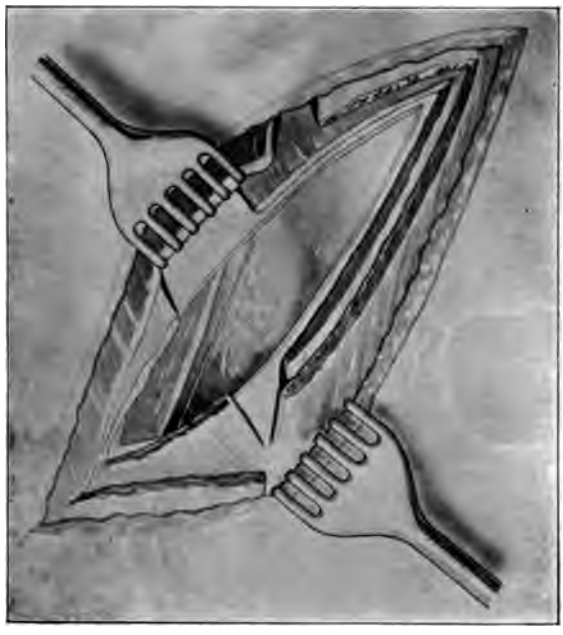


Fig. 139.

mattress sutures. If a larger vessel be severed packing with gauze and a deep suture or two on either side of the pack readily control the usually profuse hemorrhage.

If nephrotomy is performed for a suppurating process in the kidney or for a cyst, which does not necessitate or permit removal of the whole organ, the resulting cavity is cleansed with hot decinormal salt solution and a drainage tube in-

serted. In the latter case, as in all other conditions where infectious material is present, the bed of the kidney should be loosely packed with gauze,

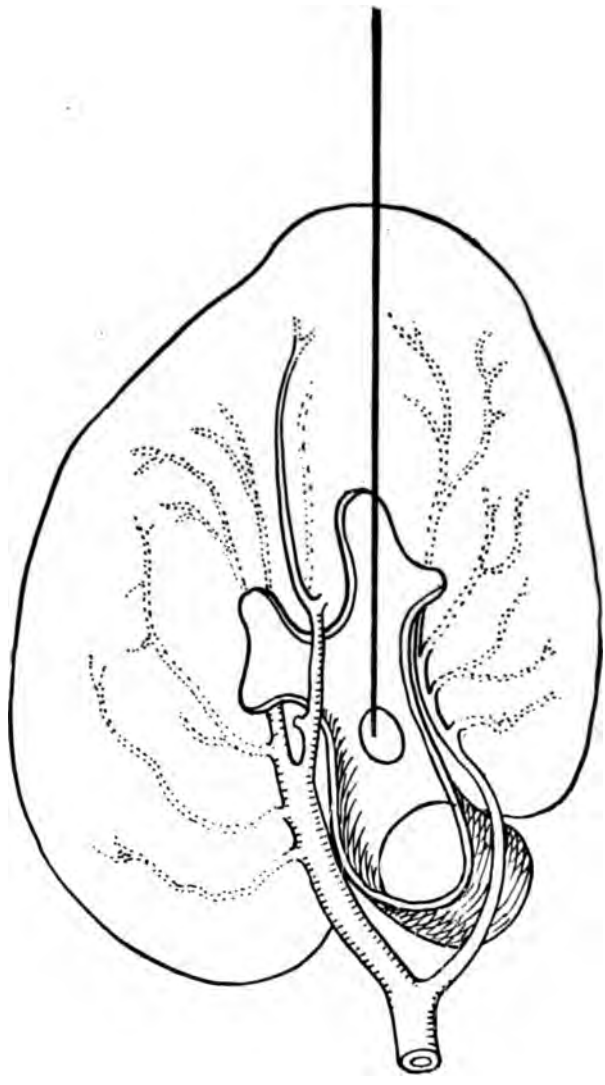


Fig. 140. Surgical line of incision into the kidney.

a large drainage tube inserted in the lowest point of the perinephric cavity and the wound only partly closed by silkworm-gut sutures. The edges

of the kidney wound may also be united with those of the fascia and muscles (Fig. 132). In a clean case no drainage is required and the wound in the loin may be closed.

Lumbar Nephrectomy

The steps required to reach the kidney for a lumbar nephrectomy are the same as for nephrotomy except that it might be desirable to make

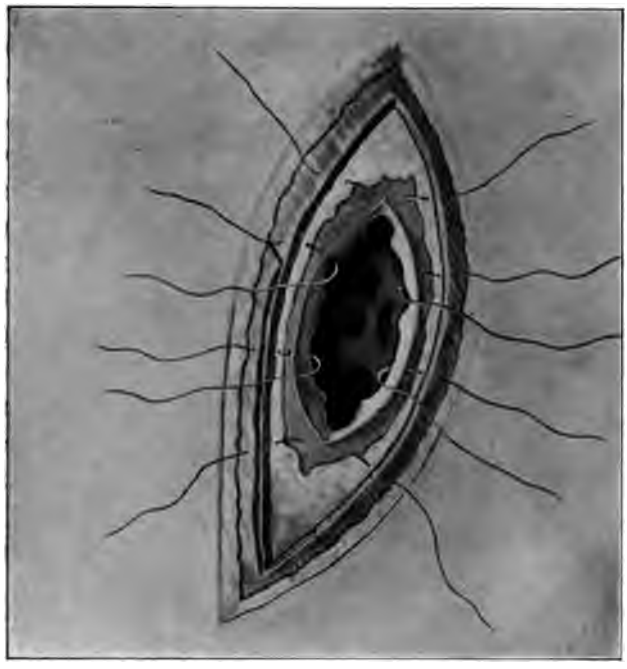


Fig. 141. Nephrostomy.

the incision somewhat larger in order to obtain more room. Eventually a second incision may be added which meets the first at a variable angle either at its highest point or somewhere along its course. In very large tumors even the resection of the last rib might become necessary to gain more space. After detaching the fatty capsule, the colon and the peritoneum, and eventually also the diaphragm from the kidney, the pedicle is brought into view and a double-ligature of

strong chromicised catgut passed between the ureter and the renal vessels. One-half of the ligature is tied around the ureter and the other half around the vessels. A compression forceps is applied to the ureter higher up and the latter divided between the forceps and the ligature. By placing a gauze pad under the part to be divided the surrounding tissues are protected against contamination with infected urine. Released from its attachment to the ureter the kidney can now be drawn well out of the wound. A strong pedicle clamp should be placed between the ligature and the kidney and the latter cut away above the clamp. The gaping vessels can now be plainly distinguished and each one should be separately secured by a ligature to guard against a hemorrhage that might be due to retraction of a vessel in a thick pedicle. All other bleeding points in the woundbed must be secured by ligature, and the latter partly closed around a large drainage tube and some gauze packed loosely in the remaining cavity.

Protection of Surrounding Tissues

The gauze should be removed after two days; the tube after five to eight days.

If the ureter be diseased—and this is usually found in tuberculosis—it must be taken away together with the kidney, which requires the extension of the incision clear down to Poupart's ligament. The ureter in such a case should not be ligated and severed from the kidney lest the woundbed be infected. Here the vessels are secured by a clamp and the kidney after being separated from the stump brought out on the loin, and wrapped in antiseptic gauze is left there while the dissection of the ureter progresses.

Care for Ureteral Stump

The manner of taking care of the ureter stump will be found described in the section on *Tuberculosis of the Kidney.*

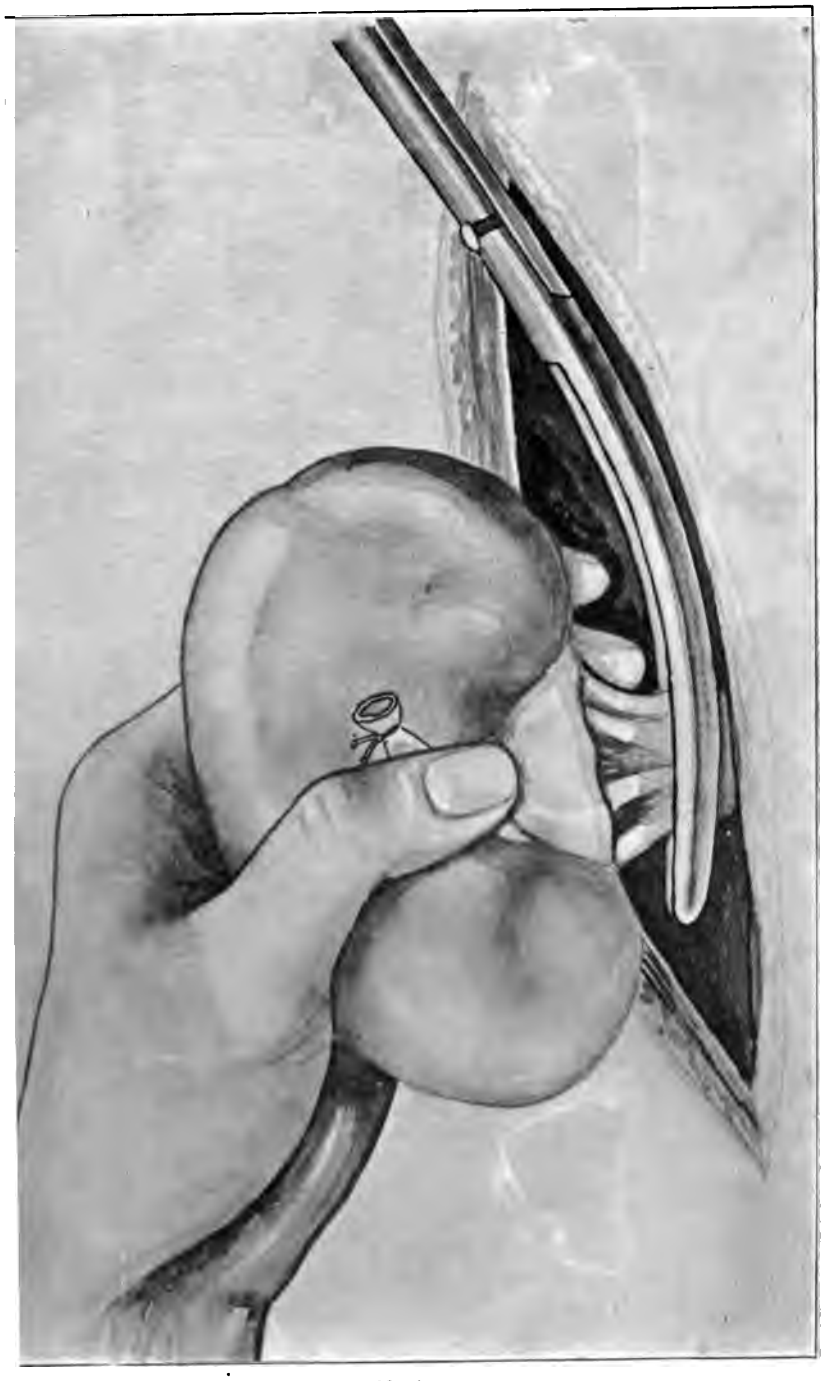


Fig. 142. Nephrectomy.

The suprarenal gland may be left behind except in a nephrectomy performed for malignant growth, in which event it should be removed together with the fatty capsule and all lymph glands around the pedicle as far as they can be followed. The fatty capsule should also be removed in all processes by which it has become involved in inflammation and infection. If left behind troublesome fistula is usually the result.

Suprarenal Gland

While it is desirable to ligate the pedicle in the manner described above, this will be found very difficult and oftentimes impossible on account of lack of space. This might be due to shortness of the pedicle or more frequently to thickening and sclerotic changes in the fatty capsule and dense adhesions between the latter and the fibrous capsule.

The pedicle might be so short that a large clamp will have to be used to secure the vessels for the first two days after the operation. If the conditions of the capsule do not permit even this procedure, sub-capsular enucleation of the kidney should be performed, and the vessels at the hilum secured *en masse* by a strong double ligature tied in the shape of an X.

Clamping of Pedicle Without Ligating

If the parenchyma becomes involved in the sclerotic process of the capsule even the separation of the kidney from its fibrous integument is rendered impossible and it has to be removed by morcellation (piecemeal) before the vessels can be reached and ligated. In very large tumors the removal of the upper posterior half of the kidney, which can be done without injuring the large vessels or the peritoneum, affords ample room for the rest of the operation—i. e., securing of the pedicle and detaching adhesions.

Morcellation

Nephrectomy is rendered very difficult by a chronic suppurating process with fistula forma-

tion in the loin—a condition which is frequently observed when for one reason or another we are compelled to leave a diseased kidney behind after a nephrotomy.

The secondary changes sometimes are such that the kidney cannot be differentiated in the mass of

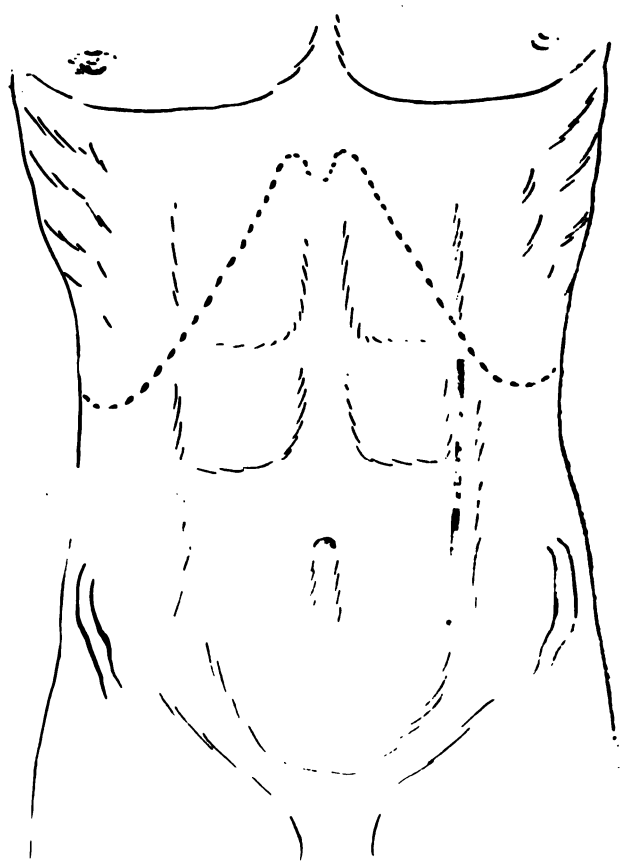


Fig. 143. Incision for transperitoneal nephrotomy and nephrectomy.

sclerotic tissue. However, the fistula serves as a guide, as it always leads to the kidney. Its mouth should be closed by a ligature or forceps before beginning the incision, so as to avoid the dissemination of infectious material over the wound bed.

For the transperitoneal nephrectomy the pa-

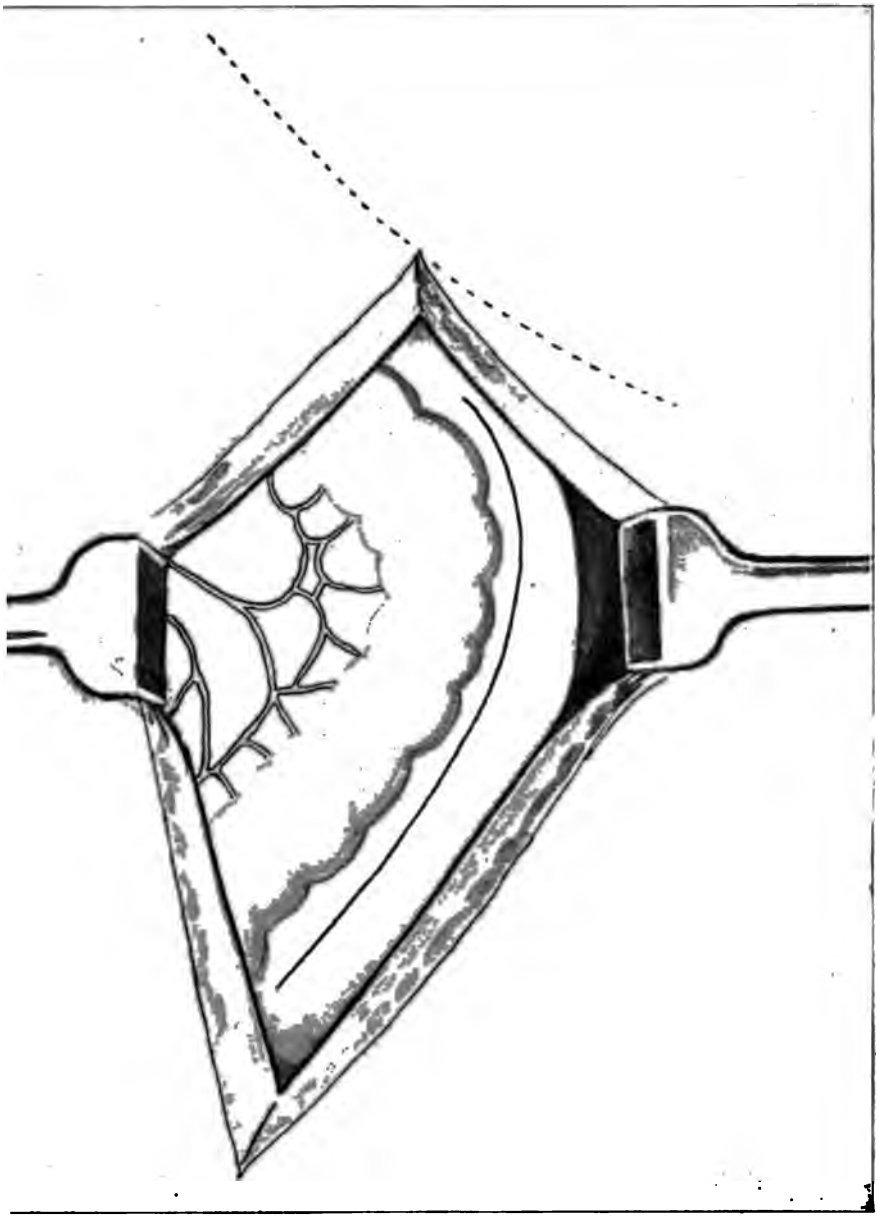


Fig. 144. Incision in mesocolon in transperitoneal nephrotomy and nephrectomy.

Transperitoneal Nephrectomy

tient is placed on the back. The abdomen is incised at the outer border of the rectus muscle over the semilunar line on the side of the operation. Before opening the peritoneum all bleeding should be stopped. After entering the peritoneal cavity the presence of the other kidney may be ascertained by digital palpation in such cases in which it was impossible to secure this important information preceding the operation. The intestines are kept well away from the operating field by large sponges held by an assistant. The outer layer of the mesocolon is incised, the renal pedicle sought by the finger of the left hand and ligated. If the vessels be ligated separately the first ligature for obvious reasons should be tied around the renal artery. The ureter is divided between a ligature placed around it as low as possible and an artery clamp applied somewhat higher up. By placing a gauze sponge under the ureter before cutting through it, contamination of the operating field may be avoided. After removing the kidney a counter opening is made in the loin through which the wound secretions are drained. The incision in the mesocolon may be closed or left open, this depending upon the choice of the operator. The abdominal wound should be closed in the usual manner.

Drainage Through Loin

Postoperative Steps

In the post-operative stage we must guard against shock and urine suppression, a danger which is enhanced by a prolonged anesthesia and the loss of blood. Hypodermoclysis with hot normal salt solutions, commenced before the patient leaves the operating table; frequent rectal injections with small quantities of the salt solution; heat around the body, and camphor-oil administered hypodermically, are the means to combat these dangers.

Hypodermoclysis

Salt Solutions by Rectum

Stimulation

THE SURGICAL TREATMENT OF NEPHRITIS.

Decapsulation

This subject has received considerable attention since the publications of R. Harrison and Edebohls. The latter author is quite enthusiastic about the efficiency of renal decapsulation in nephritis, but has so far not been able to enlist many permanent followers of this method. By splitting of the fibrous capsule or by decapsulation of the kidney we are unquestionably able to relieve the symptoms of intracapsular tension and improve the renal activity. But the improvement is mostly of a temporary nature when employing this method in Bright's disease, which latter is a systemic disorder with the nephritis as one of its symptoms. The claim of Edebohls that the nutrition of the kidneys is increased by decapsulation because of penetration of blood-vessels from the fatty capsule has not been substantiated by facts. If such penetration occasionally happens it follows so late that any relation between this occurrence and the visible improvement may be excluded. It is furthermore proven that the new capsule following the operation is of tougher and more contracting nature than the original one, and therefore must ultimately produce increased tension. Lastly it is very problematical that the same method which is successfully employed in a large congested kidney should be equally beneficial for a contracting organ. The object of surgical relief of intracapsular tension may therefore be obtained in suitable cases by a simple division of the fibrous capsule made over the convexity of the kidney to the extent of three inches. The technique of the operation is described in the section on *Nephrotomy*.

Temporary Relief

Formation and Texture of New Capsule

CHAPTER XI.

DISEASES OF THE URETER.

INJURIES OF THE URETER.

In this chapter only such wounds will be considered as occur accidentally or are made intentionally in the course of an abdominal or vaginal operation or during the act of labor.

Ureter Catheter of Assistance to Avoid Injury to Ureter During Coeliotomy

To a certain degree it is possible to avoid accidental wounding during an operation by placing a catheter into the ureter by means of which, in uncomplicated cases, the latter may be palpated wherever it comes in close proximity to the field of operation. The value of this procedure is particularly apparent in large adnexal tumors that stretch and displace the ureter so much that it is scarcely possible to differentiate it by sight or palpation. Accidental wounding of the ureter may also be prevented by this method in the operation of vagino-fixation of the uterus.

The catheter is of less assistance in those cases in which the ureter, surrounded by dense adhesions, is imbedded in the tumor mass.

Longitudinal Wounds

Longitudinal or small incomplete transverse injuries, if discovered in the course of an operation and the patient's condition permits, should be closed by Lembert sutures, including the muscular coat, but not the mucosa. Fine catgut No. 00 is preferable to silk. The apposition can be made more exact and is facilitated by the aid of a catheter in the ureter. The transverse slit should be changed into a longitudinal one to avoid the formation of a spur in the ureteral lumen.

Transverse Injuries

Should the ureter be torn or cut across various methods of anastomosis are employed, depending on the location of the injury. Most common are the end-to-end and the end-to-side implantations.

In the end-to-end anastomosis the cut ends are freed to the extent of one-fourth inch from the surrounding tissues, and brought together by silk sutures, including the fibrous and muscular, but not the mucous, coat. The coaptation must be very exact in order to obtain success and to prevent urine leakage and stenosis. This may be to a certain degree avoided by placing a catheter in the ureter beyond the line of union.

However, if the urine be not infected and no obstruction in the ureter below the line of apposition, such a fistula usually closes spontaneously within a few days or weeks.

Better results are observed by Van Hook's lateral anastomosis, which consists in the invagination of the renal part of the severed ureter into a slit made in the ligated vesical part, performed in the following manner, as described by himself:

"(*a*) Ligate the lower portion of the tube one-eighth or one-quarter of an inch from the free end. Make with fine sharp-pointed scissors a longitudinal incision twice as long as the diameter of the ureter in the wall of the lower end, one-fourth of an inch below the ligature.

"(*b*) Make an incision with the scissors in the upper portion of the ureter, beginning at the open end of the duct and carrying it up one-fourth of an inch. This incision insures the patency of the tube.

"(*c*) Pass two very small cambric sewing needles armed with one thread of sterilized catgut through the wall of the upper end of the ureter one-eighth of an inch from the extremity from

within outwards, the needles being from one-sixteenth to one-eighth of an inch apart, and equidistant from the end of the duct. It will be seen that the loop of catgut between the needles firmly grasps the end of the ureter.

"(*d*) These needles are now carried through the slit in the side of the lower end of the ureter

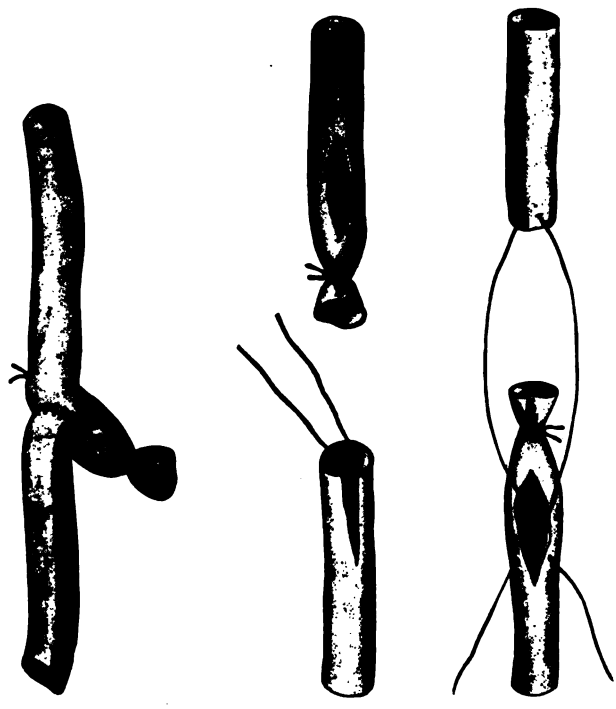


Fig. 145. Van Hook's ureter-anastomosis.

into and down the tube for half an inch, where they are pushed through the wall of the duct, side by side.

"(*e*) It will now be seen that the traction upon this catgut loop passing through the wall of the ureter will draw the upper fragment of the duct into the lower portion. This being done, the ends of the loop are tied together securely, and, as the catgut will be absorbed in a few days, calculi do not form to obstruct the passage of the urine.

"(*f*) The ureter is now enveloped carefully with peritoneum. This may be done by lifting the duct gently into the cavity of the peritoneum, drawing the serous membrane carefully behind the ureter, and after pulling the peritoneum around it, stitching it in a position to permanently enclose and protect the tube. Or the ureter may be surrounded in a completely detached fold of omentum, which is loosely attached by a stitch to the connective tissue about the duct. The omentum method is less secure than the other, since the omentum is deprived of its blood supply."

Transverse Cut Near Renal Pelvis

In a transverse cut into the uppermost part of the ureter the lower end is implanted into the renal pelvis by a lateral uretero-pyelostomy.

Transverse Cut in Pelvic Portion

In transverse injuries of the pelvic portion of the ureter the implantation of the renal part into the bladder is indicated. The operation is also performed for ureteral fistula in its lower portion, congenital abnormal location of the ureteral orifice (vagina, urethra), ureteral stricture near the bladder, and the deliberate resection of this part of the ureter in hysterectomy for malignant growth of the uterus.

The operation, according to circumstances and local conditions, may be performed extraperitoneally or intraperitoneally. In a fresh injury due to a tear or cut during a laparotomy, of course the latter route is followed.

Technique of Vesical Implantation

The ureter is dissected from its bed, its renal cut end slit laterally and a long silk loop inserted into its anterior and posterior wall about a half an inch above the cut edge. A long pair of dressing forceps is then passed through the urethra into the bladder, and the latter opened over the distal end of the instrument. The silk loops are now caught with this forceps, drawn into the blad-

der and out through the urethra. By means of these loops the ureter is dragged into the bladder to the desired distance and fastened to the bladder wall with Lembert sutures. The loops are then withdrawn and the abdomen closed.

In all these operations the peritoneum must be protected against contamination with the urine escaping from the renal part of the ureter. This is accomplished by gauze sponges laid around the cut ends and by placing a temporary ligature around the ureter.

Should any of these injuries escape notice during an operation and the subsequent urine leakage not cause a fatal peritonitis, a fistula establishes itself within a short time. If such a fistula is not amenable to a plastic operation and seriously impairs the comfort and health of the patient, or by stricture formation and ascending infection has considerably damaged the kidney, it might become necessary to perform nephrectomy. Before resorting to such an extreme step, however, it will be worth while trying to pass a catheter up to the kidney and thus deflect the urine from the fistula. This, of course, will only be possible in incomplete transverse or in longitudinal wounds, because in a complete transverse cut or tear the retraction of the severed ends prevents the passage of the catheter from the vesical to the renal part of the ureter.

Nephrectomy

Continuous Ureter Catheter in Suitable Cases

In a case which the author reported in the *American Journal of Urology,* in 1906, healing of such a lesion (Uretero-abdominal and ureterovaginal fistula) took place while the catheter remained in the renal pelvis for thirteen days.

URETERAL STRICTURE.

A stricture of the ureter can be temporarily dilated by ureteral bougies of different sizes. Softening of the coarctation may be promoted by

Dilatation by Ureteral Bougies

leaving a catheter in the ureter for several days, whereby drainage is secured. The dilatation of the stricture may then be pushed more successfully by using Albarran's ureteral catheters passed into the ureter over a guide bougie. These catheters are open at the end and have a lateral eye. In the above manner catheters up to the size of No. 13 Fr. may be passed and eventually left in the ureter for a while. If it becomes necessary to exchange the catheter the guide bougie should be introduced along and beyond the whole length of the same. The catheter may then be withdrawn, the new catheter introduced over it and the guide bougie finally removed.

Surgical Procedures

To obtain a permanent result operative measures are usually required. In suitable cases the ureter may be opened by a longitudinal incision,

Division

the stricture divided from within and the wound closed. In others resection of the strictured portion and the Van Hook invagination is indicated.

Resection

In still others situated near the bladder resection and new implantation of the renal part of the ureter into the bladder is preferable. The same procedure might be required for strictures situated near the upper end of the ureter, or a lateral

Uretero-Pyelostomy

uretero-pyelostomy will be indicated. However, most of these cases are complicated by advanced structural changes or infection in the kidney, the latter doubtless in some acting as the primary cause of the ureteral trouble, in others the stricture has caused the renal disorder.

Nephrectomy

In view of these lesions nephrectomy will be indicated, or if conditions do not warrant the radical operation pyelostomy should be performed.

URETERAL CALCULUS.

The very painful symptoms of this disorder, and the subsequent lesions of the ureter and the

kidney, demand most serious and prompt consideration.

The original seat of most of these stones is the kidney, from which they are carried into the ureter, and but very few are formed in the ureter. In the latter case they are caused by an infection in the ureter, by obstructions to the free flow of urine and by urinary salts being deposited around

Fig. 146. Ureter calculus. Author's case. Reduced to one-half of actual size.

a pus flake situated behind the stenosed part. Fig. 146 is a radiogram of such a case observed by the author. The formation of this stone, of the size of a large hazelnut, was due to an ascending gonorrheal infection and subsequent stricture formation in the lower part of the ureter.

Spontaneous Passage of Stones

Small-sized stones sometimes pass with very little or no subjective symptoms into the bladder

where they either remain and grow by accretion or are expelled. Others become impacted, especially at the anatomical narrowings of the ureter near the renal pelvis, the linea innominata, or the vesical portion, and thence give rise to most violent attacks of colic.

Impaction

Palliative Measures

The palliative treatment in such a case is the same as in renal calculus. If the attack recurs an attempt should be made to facilitate the passage of the stone by catheterization of the ureter.

Catheterization of the Ureter

Theoretically viewed, there is no reason why a stone which has passed to or below the pelvic brim should not pass on into the bladder, provided there is no ureteral stricture barring its progress, or the stone has not remained in the ureter long enough to grow by urinary deposits. Yet we often see stones spontaneously passed the size of which is larger than the average diameter of the ureter, while others of a small size remain and obstruct the ureteral lumen.

Cause of Obstruction

Sometimes the obstruction may be due to the stone changing its position in the ureter in such a way that in its downward movement its longer axis assumes an obtuse or right angle to the longitudinal axis of the ureter. Only in this way can the benefit which follows simple manipulations with the ureter catheter be explained. The latter in passing the obstruction apparently corrects the "malposition" and the stone passes out.

The injection of oil through the catheter, as others have done, is not favored by the author, because the oil is of no service if the blockade is complete and very firm, and it is unnecessary for the "Troubled waters" if a catheter can be introduced alongside of the stone.

Spasm and Inflammatory Congestion

It seems that the coincidence of spasm and inflammatory swelling of the ureteral mucosa, aggravated by the pressure of the urine from

behind, is necessary to bring about the definite arrest of the stone and the colic. In these cases the author's method of inserting a ureteral catheter beyond the obstruction and leaving it there for several days is oftentimes followed by the spontaneous expulsion of the stone. Its effect is identical to that of a filiform or small-sized catheter passed through a narrow urethral stricture into the bladder and tied in for several days. It reduces the inflammatory swelling, widens the lumen and softens the tissues. Sometimes this procedure has to be repeated as the stone, after

Continuous Ureter Catheter

Fig. 147. Ureteral calculi. Author's cases.

having moved for a certain distance, may again be arrested.

Figures 147 and 148 show the actual size of stones spontaneously passed after the above procedure. Urotropin should be administered freely before and after catheterizing the ureter.

Urotropin

However, one should not lose too much time with this conservative method or with medicamentous treatment, since the integrity of the kidney is endangered by prolonged or repeated backward pressure of the urine and the life of the patient is menaced by reflex anuria of the other kidney. It is advisable then to locate the stone and remove it surgically.

Surgical Relief

Early Operation

The stone is located by probing of the ureter

Location of Stone by A. B. Johnson's Method

with a catheter or bougie and by radiography. And lastly both methods can be successfully combined by the ingenious procedure of A. B. Johnson, of New York, as published in 1900. A flexible lead stylet inclosed in a ureter catheter is passed into the ureter and its course brought into plain view by a radiogram. In this way the stone and its location are exactly identified and possible errors with other shadows on the plate eliminated. The author has found that a two per cent. collargol solution injected into the catheter serves the same purpose as the lead stylet, and can also be utilized to outline the renal pelvis for diagnostic purposes. Simultaneously with the radiogram on the diseased side a picture of the ureter and kidney of the other side should be secured

The removal of a stone from the ureter should, wherever possible, be performed by the extraperitoneal route (the lumbar, vaginal, prerectal or vesical). This will depend on the part of the ureter in which the stone is lodged.

Even when incidentally located through a transperitoneal incision, the latter should be closed and the operation performed extraperitoneally, since in these cases there is always great danger of infecting the peritoneum.

Technique

The technique of the operation varies with the location of the stone, but in many cases the retroperitoneal incision, as performed for nephroureterectomy will be satisfactory. The introduction of a ureter catheter beyond or at least close to the stone is of valuable assistance, first because it facilitates the search for the ureter and the stone, secondly it prevents the latter from sliding downward, and thirdly it may be left with its tip in the renal pelvis for several days, draining away the urine from the ureteral wound. These points can only be duly appreciated by those who,

Value of Ureter Catheter During the Operation

by working without this aid, have had occasion for comparisons.

Incision in Ureter

It should be made a rule not to incise the ureter over the place of impaction, but wherever possible to displace the stone upwards by gentle pressure and remove it through an opening away from the place at which it was found to be lodged. It stands to reason that the tissues at the latter point, being more or less severely bruised, distended and inflamed, are not readily amenable to an exact suture, close approximation and smooth repair.

The incision in the ureter must, of course, be

Fig. 148. Ureter calculus. Author's case.

a longitudinal one. If the seat of the impaction be near the upper end of the ureter the stone should be displaced upward into the renal pelvis, from there extracted and the opening closed by fine catgut sutures. Lumbar drainage, however, is required if pyelitis be present.

Drainage

A small drainage tube should always be placed close to the suture line of the opening in the ureter to guard against urine infiltration in case of leakage. Such a fistula rarely proves troublesome and usually closes within a short time. In a few instances stenosis will occur, followed by

destruction of the kidney, which ultimately might require nephrectomy.

The operation for removal of the stone from

Fig. 149. Author's kidney tractor.

the upper part of the ureter and the renal pelvis is simplified and facilitated by the author's kidney tractor. It affords more space than is pro-

vided by steadying the kidney with the fingers, and in contrast to other devices for this purpose does not bruise the parenchyma. Its action may be likened to that of a hammock whose bottom has been cut off.

Ureter Calculus in the Female

When, in the female, the ureter is blocked by a stone near its vesical end, it can be removed by an incision through the vagina and thereby the operation considerably simplified. Stones situated near but behind the broad ligament may be removed by Garceau's method. He opens the anterior cul-de-sac, everts the ligament backward with the tip of the finger and forces the stone down towards the vaginal outlet, where a small incision in the ureteral wall permits its escape.

Garceau's Method

A stone impacted in the vesical portion of the ureter can be removed by a suprapubic or vaginal cystotomy with or without cutting down on the ureter through its vesical integument. If very near to or right at the vesical orifice of the ureter such a concretion, under favorable circumstances, may be seized with a small forceps introduced through a cystoscope (*H. Kelly*), but manipulations with a stout ureteral bougie will occasionally serve the same purpose.

After surgically removing a ureteral calculus one should always ascertain the presence or absence of other stones or pathologic conditions in the ureteral wall by passing a catheter and palpating the ureter along its whole length.

CHAPTER XII.

IMPOTENCY.

AZOOSPERMIA.

We exclude from this consideration a group of lesions which are either of a temporary nature, such as observed after a debilitating disease, or such permanent ones as are caused by cryptorchism, atrophy or bilateral syphilis of the testes, provided these lesions have terminated in complete destruction of the spermatogenetic tissues.

Bilateral Epididymitis

Azoospermia is also the necessary consequence of a bilateral epididymitis, or of unilateral epididymitis complicated by a funiculitis on the other side, a condition which is most frequently the result of a preceding gonorrhea.

Gonorrhea

In this connection it may be mentioned that the nodulation in the epididymis, and in the vas deferens, leading to occlusion of these ducts, is usually observed when acute epididymitis has been treated with cold applications, which latter interfere with the prompt absorption of the inflammatory products.

New Implantation of Vas

In case of nodulation of the epididymis the vas is severed by a transverse cut and implanted in a small incision made in the head of the epididymis, whereby the nodule is switched out and eliminated as an obstructing factor. If a part of the vas deferens has been obliterated, this part is resected and the cut ends united by fine catgut sutures. Very few good results after this operation, devised by Simmonds, have been observed.

Resection

IMPOTENTIA COEUNDI.

The treatment of this disorder requires a thorough knowledge of the morbid conditions in the genito-urinary tract; of the relations existing between the sexual centers, the genitalia and the general system; the influence of general or localized disturbances over these centers; and last, but not least, much tact and intelligence on the part of the physician. Before all, it is necessary to remember that the center for the nervi erigentes is in the lumbar spine, that there is a cerebral center capable of inhibiting erections and that this center can be much more easily excited than the former.

Erection Center

Inhibitory Center

It is further important to know that in some cases a definite cause for the disorder may be discovered, but often the trouble appears purely functional. Most frequently a predisposition, either hereditary or acquired, can be observed.

Etiology

Eliminating the cases of impotency due to organic defects and to old age, there remain three groups commanding our interest—

Types of Impotency

1. Psychical impotency without any local or central lesion.
2. The irritable weakness, and
3. The paralytic impotency.

1. (a) Most cases of the first group are due to excitation of the cerebral inhibitory center, which is responsive to all kinds of impressions, such as fear, lack of self-confidence, disgust, etc.

(b) Others again are caused by insufficient stimulation of the erection center, as is observed in men whose minds are absorbed in difficult problems and abstract matters. This is quite often the case in men of affairs, of science and of art, and in professional men. These types exhibit a healthy urogenital tract, strong morning erections and normal night emissions. Those due to

excitation of the inhibitory centers have good erections at any time except when most desired.

Psychical Treatment

The treatment of cases of type (a) is a psychical one. Anything capable of suppressing the activity of the inhibitory center may be tried, and success will largely depend on the intelligence, tact and experience of the physician. As soon as the self-confidence of the patient can be restored, he is cured. To this end one may employ electricity, hydriatic procedures, metal sounds, silver nitrate instillations, or the psychrophore, hypnosis, massage, indifferent medicines and what not. If the patient can be made to believe in the efficiency of the treatment the latter is bound to be successful, whatever it may be.

Local Applications

Ligation of Dorsal Vein

These are the cases in which good and lasting results have been recorded by Murray's method of ligating the vena dorsalis penis, but we consider such a procedure too radical and unnecessary, unless all the above mentioned measures, and others not mentioned, should have failed.

If disgust is the cause of the disorder, or lack of responsiveness on the female part, an exchange of the latter for a more suitable one—if circumstances permit!—is advisable. A blend of three-fourths of a Messalina with one-fourth of a Lucretia appeals more to the sensuality of many men than the inverse ratio; but we have known others who were repelled by the slightest display of sensuality on the part of the woman.

Sexual impotency, as observed in type (b), requires the discontinuance of everything etiologically responsible for the trouble. A short trip into the country, a sea voyage, or even steps taken at home to divert the patient's mind for a few hours daily, will be followed by an improvement. Among these are long walks, swimming, horseback riding, or golfing, which are most use-

Rest

Diversion

Outdoor Life

ful if shared by congenial and entertaining company.

2. The Irritable Weakness. The predominant symptoms of this group are weak erections and premature ejaculations. These indicate a pathological condition wherein the functional activity of the erection center is reduced, while the ejaculation center is over-stimulated. If caused by debilitating chronic diseases, such as diabetes, nephritis or malaria, a treatment directed towards the cause occasionally improves the sexual weakness. Again, the discontinuance of drugs capable of producing this disorder will be sufficient to restore normal conditions. Such drugs are the opiates, potassium iodide, the bromides and arsenic.

Causative Treatment

But the largest proportion of these cases are those represented by men of a distinct type of hereditary or acquired neuropathy, individuals frequently possessed of sufficient nerve energy, but with very little reserve fund of it and of nerve fibres which have hardly any resisting power. These patients usually give a history of early and excessive masturbation, sexual excesses and gonorrheal infection. The symptoms complained of are sometimes purely sexual, referring to the functional debility, such as premature ejaculation and incomplete erection; or they are associated with local symptoms, loss of sensation, painful ejaculation, and urinary tenesmus; or reflex symptoms, hyperesthesia, paresthesia, paresis, neuralgia, dyspepsia; or psychical disturbance, mental depression, failing memory, irritability, insomnia, fear of being alone, suicidal mania, etc. The latter symptoms are less frequently complained of by the patient than observed by those around him, and by themselves should invite investigation of the sexual apparatus and its functional condition.

Neurasthenia

Masturbation Gonorrhea

Excessive masturbation and chronic inflammatory conditions of the posterior urethra and the prostate gland are largely responsible for the ultimate sexual breakdown of these neurasthenics, inasmuch as excessive masturbation will produce exhaustion of the nervous system in general and the sexual apparatus in particular. Chronic inflammation of the veru montanum, so richly supplied with nerves, is followed by irritability or exhaustion of these nerves which transmit the reflexes, and subsequently will cause functional sexual disturbance. Chronic posterior urethritis penetrating the mucous membrane and invading the prostate gland attacks the muscular apparatus of the vesical sphincter and the fibers surrounding the ejaculatory ducts. This explains the strangury and premature ejaculation so much complained of as one of the earlier symptoms in sexual neurasthenia, oftentimes long before trouble with the erection is noticed.

Local Lesions

But we also find many neurasthenics with sexual debility who either never had a venereal infection, or if they had, do not show any local evidence of it.

In the first instance the sexual disorder represents only a reflex manifestation of the cerebral or spinal trouble, or it is a part of the general deficiency of the nervous system.

In the second variety we must presume that the local trouble gave the impetus to the sexual disturbance in a predisposed individual and that this disturbance outlives the preceding cause. These points are of importance because they bear great weight in the management of these cases.

The local symptoms resemble those observed in chronic posterior urethritis, prostatorrhea, and spermatorrhea. Except in advanced paralytic impotency, these cases are characterized by a

marked hyperesthesia of the urethra, which increases toward the prostatic portion and changes to actual pain in the region of the veru montanum if a sound or bougie of any size be introduced. The prostate, especially in this region, is extremely sensitive to the slightest rectal palpation, the pain sometimes being described as excruciating and unbearable.

Urethroscopic Diagnosis of Local Lesions

The localization, nature and extent of local lesions along the deep urethra may be determined through the urethroscope. The entire mucous membrane of the prostatic urethra appears hyperemic, swollen, of a livid color and easily bleeds in the more recent cases; while in the later stages the lesions become circumscribed, normal strata interchanging with cherry-red or livid spots, often presenting an appearance similar to the patches in granulating eyelids. These patches soon show evidence of infiltration, which later will be substituted by cicatrization. The veru montanum projects unduly into the urethra and upward toward the vesical sphincter, and the ejaculatory ducts show patulousness, caused by insufficiency of the controlling muscle fibers. Patients of this group complain of the penis shrinking and growing smaller, a phenomenon which can be explained by the spasmodic contractions of the organic muscle fibers in the corpus cavernosum, and a manifestation of the inhibitory nerves of erection.

Causative Treatment

In the treatment of this type of irritable weakness we should be guided by the etiology and by the conclusions arrived at from a careful and exhaustive examination.

In those cases in which local lesions are found which are considered responsible for, or at least, aggravate the sexual weakness, we employ the same treatment as indicated for these conditions if existing independent of the sexual disorder.

Stricture

Strictures are to be dilated rather than cut, because every severe operative procedure seems to intensify existing symptoms or produce new ones, in a neurotic individual.

Chronic Gonorrhea

Remnants of a gonorrheal infection should be treated accordingly, care being taken to avoid strongly irritating injections. In prostatitis gentle massage, the application of cold through the rectum and medicated rectal bougies or small rectal injections with medicated solutions are serviceable.

Massage

Metal Sounds

The hyperesthesia of the deep urethra, especially of the veru montanum, is best overcome by the introduction of metal sounds the caliber of which should be gradually increased to number 30 French scale. Sometimes, at least in the beginning, cold is not well borne by the urethra, and it is then necessary to heat the sound to 100° F. More effective is the psychrophore which combines mechanical and thermal qualities. The water which circulates through it is used as warm or as cold as the patient will tolerate. This treatment should be given every other day, lasting from five to twenty minutes. Improvement is noticeable after six to twelve applications; the infiltrations around the colliculus seminalis becomes absorbed; the congestion of the mucosa decreases; the granulations disappear, and sexual vigor oftentimes returns. In stubborn lesions of this sort it is necessary to make topical applications of silver nitrate through the urethroscope, and it is better to use for this purpose a ten per cent. or fifteen per cent. solution applied once in ten to fourteen days, than weaker solutions at shorter intervals. The slight irritation following these applications lasts but a few minutes, and does not compare with the violent tenesmus following instillations with much milder solutions of the drug. This latter circumstance makes

Heat and Cold

Silver Nitrate

them unsuitable for treatment of the posterior urethra in general, and particularly prohibits them in this class of cases.

Dilatation

Where in older lesions of the deep urethra cicatrization has occurred, dilatation will be found useful, but it should be employed with the utmost delicacy, reserve and caution, lest more harm than good be done. The Kollman dilator for the posterior urethra may be used for this purpose.

Less satisfactory is the treatment in those cases in which the sexual weakness is but one symptom of a general neurasthenia, with or without a preceding local lesion, or at any rate, where no such lesion, which could be responsible for the functional defect, is to be found. The difficulty is readily explained by the variety and multiplicity of the symptoms, the etiology of the disease, and the nature of the process. These patients are susceptible to all sorts of influences which inhibit erections; they are constantly brooding over their ailment; they concentrate the mind on the sexual organs and the sexual defect; and all direct local measures accentuate the feeling of moral degradation and profound melancholia.

Hygiene

Cohabitation and sexual excitement of every kind should here be prohibited for quite a while. Tonics, outdoor life, sea baths, and a nutritious

Diet

diet are helpful. Most popular are nux vomica, phosphorus, ergotin and strychnia. Inorganic phosphorus as contained in lecithin is considered more efficient. While phosphorus in quantities safe for internal use cannot be considered an aphrodisiac, it is certainly a tissue builder and

Phosphorus

may be of assistance. Phosphorus and nux vomica may be prescribed in combination—

℞

Zinc phosphoratum, 0.25 gm.
Ext. nux vom., 1.0 gm.
Ext. acori q. s. f. pill No. 50.
M.
Sig. Three pills a day.

Another formula much used is—

℞

Syr. hypophosph. (Fellows), 180.0
Sig. Two teaspoonfuls in half a glass of water twice to three times daily, after meals.

Or—

℞

Acid phosphor. dil., 120.0
Sig. Twenty drops in half glass of water three times daily.

Ergot

Prostatorrhea and spermatorrhea are favorably influenced by ergotin, which, to a certain extent, controls secretions, allays irritation, and acts as a tonic for muscular relaxation.

℞

Ergotin, 1.0
Sacch. lact., 2.0
M.
Div. in dose X.
Sig. A powder three times daily.

Or—

℞

Ergotol, 30.0 gm.

Administered by mouth or hypodermically in a dose of ten drops.

Electricity

Electricity in its various forms is of much assistance. The faradic current may be employed in cases distinguished by loss of peripheral sensitiveness and by weak erections. A mild current may be used along the spine, or applied to the bulbous muscle, the perineum, the glans penis,

Faradic Current

and along the spermatic cord. The earlier treatments should not exceed three to five minutes, and they should be given two to three days apart; later they may be extended to ten and fifteen minutes. The faradic current is not advisable in premature ejaculations. The galvanic current is preferable in these cases. It should have a strength of ten to fifteen milliamperes, and the treatment extended to five minutes. The negative pole is applied to the lower thoracic spine, the positive to the lumbar spine and the sacrum; or the negative pole is placed to the lumbar spine and the positive to the testicles, penis and perineum.

Galvanism

The endo-urethral application of electricity in these cases is harmful and should be discouraged.

Static Electricity

When employing the static wave current, the testicle and penis should be wrapped in tinfoil, a tin electrode wrapped around this and a two-inch spark used.

Aphrodisiacs

Of the various aphrodisiacs exploited in the last decade none has stood the test of time. Most of them act merely by suggestion, or auto-suggestion, in those cases in which anything else would have an equal effect on the imagination, or appeal to the intelligence or faith of the patient.

Yohimbin

The much exploited Yohimbin produces hyperemia of the sexual glands and the corpus cavernosum, and it will effect erections in cases due to lack of blood-supply, but in the great majority of patients the trouble lies in the nerves which control and check the reflux of blood from the erectible tissues, and, therefore, the field of usefulness of the drug is rather limited. In appropriate cases it may be given in doses of from five milligrammes to fifteen milligrammes three times daily. One should not expect any immediate results from Yohimbin, usually four to six weeks

being required to show the effect of the drug. It is best to commence with 5 mgm. (1-12 grain) three times daily and increase the dose gradually from week to week until the maximum of 15 mgm. three times daily is reached. The drug may also be hypodermically administered, using ½ to 1 cc. of a two per cent. aqueous solution.

Dose

Hypodermic Administration

℞

Yohimbin hydrochlor.,	0.20
Aqua destil.,	10.0
Chloroform,	gtt. i

M.

Cardiac asthma and palpitation, severe headache, or much nervous excitement demand a reduction in the doses, while heart lesions or inflammatory conditions in the pelvic organs or in the genitals strictly contraindicate its employment altogether.

The suspension treatment, according to Vecki, has given gratifying results in some cases of functional neurasthenia of this sort. He uses Sayre's apparatus and the duration of the suspension varies from two to five minutes.

Suspension-Treatment

Hypnotism may be expected to have its field of usefulness here as well as in the cure of other functional disorders.

Hypnotism

In exceptional cases I obtain good results from the epidural injections (described in the treatment of cystitis). Being a harmless procedure if properly performed it should be given a trial before abandoning a case as hopeless.

Epidural Injections

3. *Paralytic Impotency.* Paralytic impotence is not amenable to any treatment, except in the early stage following the irritable weakness. The methods employed for the latter occasionally effect some improvement of the former, but this is the exception.

CHAPTER XIII.

SYPHILIS.

Immunization Serum

With the discovery of the spirochæta pallida as the cause of syphilis (*Schandinn,* 1905) the interest in the prevention of the disease received a new impetus followed by attempts to produce an immunizing serum. So far these experiments have been successful in monkeys only, and Neisser, who recently returned from India where he experimented extensively on monkeys, does not believe in the possibility of producing such a serum. His conclusions are based on the fact that he was able to produce typical reinfection of animals who had been previously infected and on the undisputed identical experience on human beings, who after being cured from syphilitic manifestations contracted an initial sclerosis followed by typical secondary lesions. But the discovery of the parasite has placed the present mode of the treatment of syphilis on a solid foundation.

Prophylaxis

For prohpylactic purposes calomel is unquestionably very useful if applied with in twenty-four hours to the part which was exposed to the contagion. It is prescribed as a three per cent. ointment: Calomel 1.0 grm. (15 grains), lanolin 30 grm., (1 ounce).

The treatment of syphilis is both a local and a constitutional one.

Local Treatment

(1) With local treatment we attempt to destroy, or at least weaken, the specific virus wherever its initial presence is evidenced by pathological

lesions. This may be accomplished by *cauterization* or by *excision* of the venereal sore.

Excision of Chancre

According to Fournier excision gives an average of one success in five cases, the success depending upon the length of time between the appearance of the chancre and its surgical removal. Even if failure as an abortive procedure occurs, the excision of the chancre certainly renders the subsequent course of the disease much milder.

Cautery

Cauterization of the venereal ulcer is less effectual as an abortive means. In fact, I do not believe that such is possible, but it unquestionably lessens the severity of the subsequent symptoms. Neither procedure is indicated when the adjoining lymphatics are already involved.

Antiseptics

The venereal ulcer should be treated on general surgical principles like any other wound. I employ mild antiseptic solutions like two per cent. carbolic acid, or 1 in 3000 bichloride of mercury, or 1 in 2000 sublamin, for cleansing, followed by a thin layer of dusting powder on the dried surface. Most effective, but obnoxious on account of its odor, is iodoform used pure or with equal parts of boric acid. Instead of this dermatol, iodol, or europhen may be employed. Gauze compresses saturated with any of the above solutions may be applied several times a day to chancres with sluggish granulations showing little tendency to heal. Gangrenous or phagedenic chancres require cauterizing with the Paquelin, followed by the application of the nitrate of silver pencil, or a ten per cent. zinc chloride solution, or nitric acid. Sometimes cauterization will have to be preceded by a thorough curettage of the ulcer, both procedures requiring a general anesthetic, for which purpose somnoform is very useful. As soon as the ulcer has a healthy appearance and one does not wish to commence with the constitutional treatment, it should be covered

Iodoform, Dermatol, Iodol, Europhen

Phagedenic Ulcer

Mercury Plaster

with Unna's mercury plaster mull, to be changed once or twice a day, depending on the amount of wound secretion. This plaster mull is applied even after the sore has healed, as long as the induration is noticeable, as in this way remnants of the syphilitic virus are effectively destroyed, which if left to themselves, sooner or later lead to renewed specific manifestations. If phimosis has been caused by chancre, and if the latter is not accessible to local treatment, expose the ulcer by circumcision or by a dorsal division of the prepuce, the technique of which is described in the section on *Balanitis*.

Phimosis

Constitutional Treatment

The constitutional treatment should be commenced as soon as the specific nature of the lesion is recognized. This will materially assist in the rapid healing of the latter.

Vaginal Ulcer

Chancres in the vagina and on the cervix may be exposed by a speculum and treated in the same manner as elsewhere, but the mercury is applied as ointment on a gauze tampon. The latter has to be omitted during pregnancy and in its stead vaginal balls of equal parts of cocoa butter and mercury ointment are inserted.

Ulcer in Mouth

Initial lesions in the mouth and on the tonsils require daily applications of a ten per cent. solution of bichloride of mercury in alcohol or ether.

Venereal Papillomata

Venereal papillomata yield to the daily application of resorcin.

℞

Resorcin,	9.0 (ʒii ¼)
Sacchar.,	1.0 (gr. xv)

Sig. Dusting powder.

Or

℞

Resorcin,	5.0 (gr. lxxv)
Aqua destil.,	100.0 (ʒiijss)

Sig. Apply on gauze sponge.

Or

℞

Acid lactic.
Ether sulph. āā, 10.00 (3iiss)
Hydrarg. chlor. cor., 0.10 (gr. jss)
Sig. Apply with a brush once a day.

Very effective because one application usually suffices is:

℞

Plumb. causticum.
Solut. potass. caustic (30 per cent.) āā, 7.50 (3ii)
Lithargyri, 0.25 (gr. jv)
Sig. Apply with the point of a wooden stick.

This mixture should be applied to the whole surface of the growth and the healthy skin protected during the application. Papillomata resisting this treatment may be curetted and cauterized with Paquelin, using somnoform as an anesthetic. The condylomata around the anus usually disappear under calomel dusting powder, or equal parts of calomel and bismuth subnitrate, and an isolating gauze pad. The powder should be applied twice a day and the lesion cleansed with lukewarm normal salt solution preceding each application.

Condylomata ad Anum

Calomel

Bubo

Indurated lymph glands should be covered with mercury plaster mull which may be renewed daily or every other day. The plaster should be applied as long as induration is palpable, in order to destroy possible remnants of the syphilitic virus.

Suppurating glands should be opened and treated in the following manner: After shaving and cleansing the region in the customary way and anesthetizing with ethyl-chlorid, an incision is made in the long axis of the bubo and carried down to the pus cavity; the latter is not only ex-

posed, but its contents squeezed out with the fingers by rather hard pressure all over the region. This is kept up for a minute or so until the fluid becomes free from pus and appears sanguinolent. The abscess cavity should not be irrigated, only the edge of the wound cleansed with boiling hot water. Now the wound is closed by an interrupted horsehair suture. No drainage is necessary. The region is cleansed with hot sponges once more and a gauze collodion dressing applied. Over this comes a compressing pad and bandage to be maintained for several days. The sutures may be removed after ten days, at which time, if at all, healing by primary union has occurred.

Onychia

Onychia and paronychia require a daily local bath in bichloride of mercury solution in the strength of 1 in 2000, followed by a dusting with

℞

Calomel,	2.0 (gr. xxx)
Talcum venet.,	20.0 (℥v)

Sig. Dusting powder.

Gummata

Gummata which are not yet liquefied or not exulcerated are often absorbed by a twenty per cent. solution of iodine or mercury plaster mull, or a ten per cent. calomel traumaticin mixture applied daily.

Traumaticine is a solution of one part of gutta percha in ten parts of chloroform. It is preferable to collodion because it can be readily washed off.

The formula for the preparation of a twenty per cent. solution of iodine is given in the section on *Chancroid.*

℞

Calomel,	5.00 (℥jss)
Traumaticini,	20.0 (℥v)

Sig. Shake well, apply with brush.

Mucous Patches

An exulcerated gumma is treated like a phagedenic ulcer; mucous patches in the mouth with

a ten per cent. alcoholic solution of bichloride, or a ten per cent, aqueous solution of chromic acid, applied with a brush or on a cotton swab every day or every other day as the lesion may require. The cotton or brush should not be saturated with the solution, but only moistened in order to avoid the corrosive effect on the tissues. If used in the proper manner this solution is superior to the much employed silver nitrate.

Psoriasis Specifica

Psoriatic eruptions on the palm of the hand and sole of the foot should be kept covered with mercury plaster-mull. If the hyperkeratosis be very thick it should be first softened and removed by the application of emplastrum saponato-salicylicum for several days. If plasters cannot be employed for external reasons, the afflicted part should be immersed in a 1 in 1000 bichloride solution for ten minutes daily and then rinsed in warm water.

Bichloride Bath

Alopecia

Alopecia usually yields to the constitutional treatment, but it is also benefited by application at night of ten per cent. ammoniated mercury ointment, which should be washed out the following morning.

Constitutional Treatment

The constitutional treatment should be commenced as soon as the syphilitic character of the ulcer is with certainty established and the healing process retarded, and in all secondary and tertiary manifestations of the disease. We possess three specific remedies for this purpose, *mercury, iodine* and *arsenic*. The sovereign remedy is mercury. It may be administered: 1. By the mouth. 2. By inunction. 3. By injection.

Mercury
Iodine
Arsenic

Preceding the treatment attention should be devoted to the action of the gastro-intestinal tract; the diet regulated; the urine examined; and the mouth and teeth put in the best possible condition.

Mode of Administering Mercury

By mouth, mercury may be given in pills or capsules, but we must remember the caustic action of the drug on the intestinal tract. Hydrargyrum oxydulatum tannicum is very effective.

℞

Hydrargyrum oxyd. tannic.,	2.50 (gr. xl)
Opii p.,	0.25 (gr. iv)
Sacch. lact.,	3.50 (ʒijss)
Lanolin,	1.25 (gr. xx)

M. f. pill No. 50.
Sig. Four to six pills a day.

Internal Medication

Opium may be added when the bowels are very loose. Hydrargyrum oxydulatum tannicum is incompatible with carbonates and iodine preparations.

Equally efficient as the above is

℞

Hydrarg. protoioidid.,	1.50 (gr. xxiii)
Decoct. opii aq.,	0.50 (gr. vijss)
Lanolin,	1.50 (gr. xxiij)
Sacch. lact.,	4.50 (rg. lxx)

M. f. pill No. 50.
Sig. Four to five pills a day.

This prescription should call for a small number of pills, in order that they may be fresh at all times. Those which are kept in stock are sometimes very old and get so hard that the gastro-intestinal juices are not able to dissolve them; and I have no doubt that many disappointing results are due to this fact.

Intestinal Disorders

Mercury, given by mouth, should be taken immediately after a meal. In case of diarrhea its use must be discontinued and opium given. If

the intestinal irritation recurs after the drug is resumed, this mode of treatment must be abandoned and inunction or injections resorted to.

Cypridol

More recently cypridol, a one per cent. solution of biniodide of mercury in oil, has been used. It may be given systematically for three weeks in the first three months in doses of two capsules, three or four times a day after meals. For the following three months the same amount is given every alternate fortnight, and after that eight days of each succeeding month for three consecutive years. The claim is made that it is not so irritating to the gastro-intestinal tract as the other preparations of mercury, which limits their value on account of the small amount of the drug that can be administered by mouth, and it is just the thoroughness and exactness of the initial treatment which has a very decided influence over the whole future course of the disease.

Inunctions

For inunctions unguentum hydrargyri is used, mixed with equal parts of unguentum petrolatum. It is dispensed in gelatin capsules or in paraffin paper, each containing two to three grammes (30-45 grains) of the ointment for an adult, and one-half to one gramme for a child.

℞

Unguenti hydrargyri,
Unguenti petrolati,
āā 1.50 (gr. xxiii)
(Caps. gelatin) paraffin paper No. XII.
Sig. Use as directed.

Wherever possible easily accessible hairless portions of the skin should be selected, and each inunction applied to new parts, following a set cycle as, for instance,

First night—arms and forearms.

Second night—both sides of chest
Third night—the loins.
Fourth night—the abdomen.
Fifth night—inner surface of thighs.
Sixth night—no inunction, warm bath.
Seventh night—inunction as on first night, etc., etc.

Cutaneous Irritation

In this way unnecessary cutaneous irritation (eczema mercuriale—folliculitis—toxic erythema) is usually avoided. The inunction should be made by the patient himself, but if made by anyone else rubber gloves should be worn. Each rubbing requires about twenty minutes, and it is a good plan to rub in small portions—about the size of a bean—of the ointment at a time; this procedure to be repeated when the skin becomes dry.

Disadvantages

The disadvantages of this mode of treatment are its uncleanliness; the irritating effect on the skin; the time consumed by each application; and the impossibility of an exact dosage. Most of the mercury contained in the ointment evaporates when brought in contact with the living body, the greater part of the vapors entering the system through the respiratory organs, the smaller part through the skin. This explains why patients treated under otherwise identical conditions are sometimes easily salivated and at other times do not seem to respond to the treatment at all. These different observations largely depend on the temperature surrounding the body after the inunction. Instinctively older syphilologists ordered the inunctions to be made in superheated rooms and had the patients wrapped in flannel blankets for hours afterwards.

Resorbin Mercury

Instead of this preparation resorbin mercury may be used which is odorless and smoother than the former. It is dispensed in graduated glass tubes, each mark of which indicates 1. gramm (15

grains) of the ointment. Much cleaner than either preparation, and therefore preferable, is Unna's mercury soap which is applied with the aid of warm water.

Mercury Soap

℞

Sapo hydrargyri unguin., 4.0 (1 dram)
M. ft. in caps. gelatin, No. xii.
S. Use as directed.

Instead of the mercurial ointments, mercury plasters or the plaster mull spread over large areas of the body may be used to advantage, especially in children. It is renewed once a week.

Plaster Preferable for Children

℞

Emplastr. hydrarg. oleinicum,
Emplastr. plumbi olein., āā 140.0 (℥ivss)
Hydrargy depur.,
for adults, 60.0 (℥ij)
for children, 30.0 (℥i)
Sig. Plaster.

Another way of administering mercury externally is the bichloride of mercury bath, but, in order to be really effective, i. e., penetrate through the skin, it has to be given in connection with electric kataphoresis, which is accomplished by the electric two-cell bath.

The quantity required for a bath varies from ten to fifteen grammes (150 to 225 grains) of bichloride of mercury. It is useful in the treatment of very young children, and of moist papular, pustular, and ulcerating syphilitic lesions of the skin. Young children should be placed in a small tub for ten to fifteen minutes, the water con-

Bichloride Bath for Children

taining 0.30 gm. (5 grains) of bichloride of mercury.

Injection-Treatment

For the subcutaneous application of mercury soluble and insoluble preparations are employed. They are injected hypodermically or intramuscularly. Best known and most generally used, among the soluble preparations, is the bichloride of mercury. It may be prescribed in one per cent. to five per cent. solutions to which is added an equal amount of sodium chloride, which prevents the precipitation of albuminates of mercury.

Soluble Preparations

℞

Hydrarg. chlor,
corros, 1.0-5.0 (gr. xv-gr. lxxv)
Natrii chlor.,
1.0-5.0 (gr. xv-gr. lxxv)
Aqua destill., 100.0 (℥iijss)
Sig. Bichloride solution.

Mode of Injecting

Usually 1 cc., equal to 0.01 of bichloride of mercury, is injected in the gluteal region daily, or every other day, as the case may require. It is well to follow a certain routine in injecting. The injections should be given alternately in the left and right buttock each one about one inch apart on two imaginary lines, one of which is drawn vertically over the highest elevation on each half of the buttocks, the other horizontally crossing the former at the highest point of the buttocks. In this way the solution is deposited in a new place each time. It should be injected slowly in order to avoid painful bruising and unnecessary destruction of tissue; a slight short massage following the withdrawal of the needle will spread the fluid over a larger area. The syringe may be made entirely of glass or of glass with hard rubber trimmings, the needle of platinum-iridum—

Platin-iridium Needle

1¼ to 1½ inches long and narrow gauged. When using shorter needles the fluid is placed too close to the skin, causing inflammation, eventually even necrosis; while, when longer needles are used, as for intramuscular injections, these are followed by extremely painful infiltrations. With needles of the above length, I am able to deposit the fluid in the loose tissue right over the gluteal muscles, avoiding all these disagreeable features. What little pain is experienced ceases soon or is quickly checked by the application of heat. The platinum-iridium-needle is preferable to a steel needle because the latter easily becomes corroded and punctured along its walls, allowing the solution to escape through these little holes into tissues close to the skin, producing the above mentioned inflammations.

Precautions

It is hardly necessary to say that the same antiseptic precautions as in ordinary hypodermic injections should be rigidly observed, or to mention the yet quite rare possibility of an embolus, due to the puncturing of, and injection into, one of the large gluteal veins. The latter accident can be easily avoided by watching the needle's guard after it is pushed through the tissues; if no blood flows from it, the syringe is attached and the solution injected. If blood appears at the proximal end of the needle, the latter is moved to another part.

Cypridol may also be injected hypodermically like bichloride of mercury in the dose of 0.5 cc., equal to one one-hundredth grain of the bicloride. The needle used must be of a larger size on account of the oil passing through it. Otherwise the same rules as in bichloride injections belong to its application.

Insoluble Preparations

Of the insoluble mercury preparations Lang's "gray oil" has stood the test of many thousand

cases within the last twenty years. It is a compound of fat, oil and metallic mercury, dispensed as a fifty per cent. and a thirty per cent. liquid; the former consisting of two parts of mercury and one part each of lanolin and vaselin oil.

Gray Oil

℞

Unguent cinereum lanolinat. forte, 9.0 (3ij¼)
Olei vaselini, 3.0 (gr. xlv)
Sig. Oleum cinerum 50 per cent.

The fluid should be slightly warmed and well shaken before being used. The dose for one injection is 0.05 cc., equal to 0.04 metallic mercury, and is administered at intervals of three days until a decided improvement in the symptoms becomes apparent, when but one injection a week is given and two more injections at an interval of two weeks after all symptoms have subsided. Rarely more than twelve injections are required to accomplish this end.

The oil is deposited in the back about two inches from the dorsal spine. The needle is inserted almost parallel to and underneath the cutis. If this is observed the injection is almost painless and not followed by induration and inflammation. This is due to the lack of corrosive properties of the remedy and the very small quantity incorporated, which precludes bruising or destruction of tissue. Each following injection should be placed about two inches from the preceding one. If it is desired to inject more than 0.05 cc. this should be done in two equal parts of 0.05 cc. and in two different places. The advantages of the gray oil are, as said before, the small volume required for one application, the absence of reactive inflammation and the longer remnance

Value and Danger of Remnance

of the preparation which establishes a reserve in the tissues to draw upon much longer than from soluble mercury solutions. But therein lies also the danger of an oversupply in the hands of those not familiar with the drug, the disease and the symptoms.

Reviewing the various methods of administering mercury, we can see the superiority of subcutaneous injections. They permit an exact dosage, guarding in this way against either mercurial intoxication by an overdose, or insufficient action by loss of part of the drug on its route to the circulation. No inconvenience in their application is experienced, no uncleanliness likely to call the attention of others to the ailment connected with it, and gastro-intestinal irritation and skin lesions are practically unknown.

Tonics

Simultaneously with the administration of mercury a tonic should be given. I have found peptomanganate of iron and the irontropon most valuable; a teaspoonful of either preparation is given after meals, the latter in milk, Port wine or water.

Mercurialism

Irrespective of the way mercury is incorporated, symptoms of mercurialism are occasionally observed; sometimes due to an overdose and at others to an individual idiosyncrasy. The manifestations observed are stomatitis, gastro-intestinal irritation, toxic erythema, anemia, neurosis, and neuritis. As soon as these symptoms occur, the administration of mercury must be discontinued. Usually the trouble soon passes off and the treatment may be resumed. In the cases of idiosyncrasy other remedies will have to be employed.

Iodin Preparations

Iodin is next to mercury and most used in combating syphilis, especially the potassium iodid, the sodium iodid and the rubidium iodid. The

latter is comparatively free from the toxic qualities of the other two preparations. The dose varies from 1.0 to 10.0 (15 grains to 1-3 ounce) and more pro die. It may be given by mouth in liquid or pills, excepting in intolerance of the stomach, when it should be used in aqueous solution by rectum.

℞
Potass. iodid,
Or
Sodium iodid,
Or
Rubid. iodid,
5.0-10.0 (gr. lxxv to gr. ʒijss)
Aqua destill., 200.0 (ʒvij)
Sig. One to three tablespoonfuls in water, essence of pepsin, or milk, three times daily.

℞
Potass. iodid, 10.0 (3ijss)
Or
Sodium iod.,
Sacchar. lact., 5.0 (gr. lxxv)
M. Ft. Pill No. 50.
Sig. Two to ten pills a day.

Symptoms of Iodism

The most common symptoms of iodin intoxication (iodism) are severe headache, coryza, edema around the eyes, cough, acne and iodin exanthema. Should any of these symptoms appear the iodin medication must be discontinued. The addition of a grain of belladonna extract to fifty pills frequently prevents iodism.

Potassium iodid is incompatible with calomel, forming a caustic compound; they should therefore not be prescribed together.

Indications

The iodid preparations are very effectual in the late forms of syphilis—serpiginous syphilide of the skin, gummata of the skin, fascia, muscles, and bone syphilis, ulcerations of the pharynx and larynx, syphilis of internal organs and the central nervous system. They have to be used in malignant syphilis instead of mercury, at least for a while preceding the administration of the latter drug, and in all cases of idiosyncrasy for mercury. They are very effective with or without antipyrin for severe headache, pain in bones and joints preceding or accompanying the eruptive stage.

℞

Antipyrin, 2.0-3.0 (gr. xxx-xlv)
Potassium iodid, 4.0-8.0 (ʒss-ʒij)
Aqua destill., 200.0 (ʒvij)
Sig. A tablespoonful in water, twice or three times a day.

Mixed Treatment

Iodin is the remedy of choice in syphilis of tuberculous, scrofulous, highly emaciated patients. In malignant syphilis, iodin preparations instead of mercury are used until the general condition of the patient permits the employment of the latter drug. The indications for the choice of iodine in these cases are easily recognized by the fact that in spite of the mercury the progressive nature of the lesions cannot be checked. In some very stubborn cases decided improvement will follow the combined administration of iodine and mercury after either of them employed separately have failed to be effectual.

Arsenic

Arsenic also has a specific effect on the syphilitic virous and is especially indicated in stubborn skin lesions and mucous patches in the mouth, and in all cases in which mercury or iodine

would be out of place for previously stated reasons. It may be given in the form of Fowler's solution or in pills but can also be administered hypodermically. Most suitable, because non-irritating and almost devoid of toxic qualities, is a preparation called Enosol—a combination of mercury and arsenic, of which 0.06 gm. (1 grain) may be injected in the buttock daily. Between twenty and thirty injections are sufficient. **Indications**

How long to continue the treatment of syphilis depends on the views one holds regarding the nature of the trouble. Some believe in the temporary treatment; others in the continuous treatment, and the followers of Fournier in the chronic intermittent or interrupted treatment. While the adherents of the first method believe in treating only in the presence of visible lesions, the advocates of the second method administer mercury, or mercury alternating with iodin and other drugs, more or less continuously for a number of years, irrespective of the presence or absence of luetic manifestations. The temporary treatment evidently is inadequate, while under the continuous method a tolerance for the specific drugs is established which weakens their therapeutic effect. **Duration of Treatment**

The best results observed belong to the third method. The treatment should extend over a term of not less than three years, and in the absence of special indications not over five years. If injections or inunctions are used, the patient should first receive as many as are required to make the symptoms disappear, and then half as many more. Then comes an interval of about two months, four weeks of which, in the first year, may be utilized to give iodin. Then again half as many injections or inunctions as were given altogether in the first course, and this followed by

four weeks of iodin medication and four weeks of rest. The same procedure is repeated once more. In the second and third year, unless the indications require a change from the routine, this course of treatment may be given twice each year, and in the fourth and fifth year one course only.

Heredity

Hereditary syphilis should be treated upon the same principles as the acquired form. As a result of the preventative mercurial treatment of a luetic mother apparently healthy children are frequently born. The same procedure ought to be tried where the mother appears healthy but the father is luetic.

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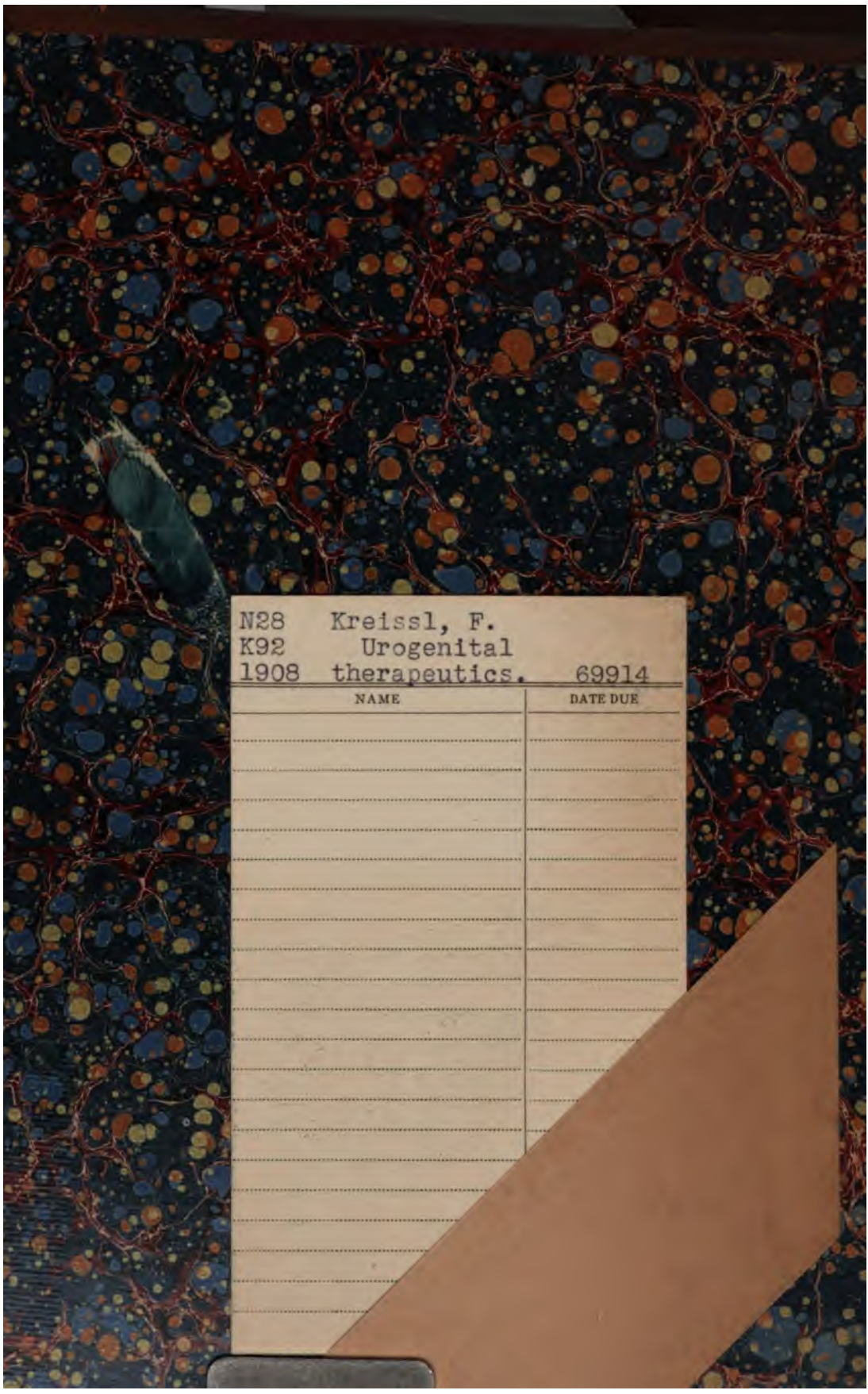
N28 Kreissl, F.
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